TM 11026A-OI

U.S. MARINE CORPS TECHNICAL MANUAL

SYSTEM OPERATION AND MAINTENANCE

ENGINEER EQUIPMENT TRAILER (EET)
MODEL MTO20A1
NSN: 2330-01-518-3809

FOR OFFICAL USE ONLY

January 2010
PCN 184 110260 00

DEPARTMENT OF THE NAVY
Headquarters, U.S. Marine Corps
Washington, DC 20380-0001

30 April 2005

1. This Technical Manual (TM), authenticated for Marine Corps use and effective upon receipt, provides operation and maintenance levels as determined by TM 11026A-OI of the Engineer Equipment Trailer, National Stock Number (NSN) 2330-01-518-3809.

2. Submit notice of discrepancies or suggested changes on a NAVMC 10772. The NAVMC may be submitted via the Internet using website http://logcom.usmc.mil/home.htm, scrolling down to the NAVMC 10772 Tracking Program and following instructions provided. It may also be submitted by electronic mail to mbmatcommarlogbases@logcom.usmc.mil, or by mailing paper copy NAVMC 10772 in an envelope addressed to Commander, Marine Corps Systems Command, Attn: Assistant Commander Acquisition and Logistics (LOG/TP), 814 Radford Blvd, Suite 20343, Albany, Georgia 31704-0343.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

OFFICIAL:

W. P. MACECEVIC
Program Manager, Engineer Systems
Marine Corps Systems Command

DISTRIBUTION: EDO

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF TABLES

SAFETY SUMMARY

Safety is the operator's responsibility. Most accidents occur due to neglect or carelessness. Avoid needless accidents by following all safety precautions.

The following warning and caution safety precautions are listed below from all parts of this technical manual:

WARNINGS

DO NOT EXCEED THE LOAD AND SPEED LIMITATIONS OF THE TRAILER. (PAGE 1-2)

DO NOT ENGAGE ENGINE BRAKE WHEN TRAILER IS COUPLED TO THE PRIME MOVER. (PAGE 2-10

VISIBILITY FROM THE PRIME MOVER IS SIGNIFICANTLY REDUCED WHEN BACKING, WHETHER THE TRAILER IS LOADED OR NOT. PROPER PROCEDURES MUST BE FOLLOWED AND EXTREME CAUTION USED WHEN BACKING TO PREVENT DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL. (PAGE 2-10)

CAGING THE BRAKES DISABLES THE SPRING (PARKING/ EMERGENCY) BRAKE. WHEN THE BRAKES HAVE BEEN CAGED, THE TRAILER SHOULD ONLY BE MOVED UNDER EMERGENCY CIRCUMSTANCES AND THEN ONLY WITH EXTREME CAUTION AND AT VERY LOW SPEEDS. (PAGE 2-11)

THE SPRING INSIDE THE SPRING BRAKE CHAMBER IS UNDER VERY HIGH PRESSURE. DO NOT ATTEMPT TO REMOVE THE PERMANENT CLAMP ON THE PRESSURE SIDE OF THE SPRING BRAKE (END CAGING BOLT IS INSERTED). FAILURE TO TREAT THE SPRING BRAKE CHAMBER WITH CAUTION MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 2-11)

THE SPRING BRAKE CHAMBER CONTAINS A SPRING UNDER HIGH PRESSURE. TO PREVENT PERSONAL INJURY OR DEATH, NEVER WORK DIRECTLY BEHIND THE SPRING BRAKE CHAMBER. IF THE CAGING BOLT WILL NOT ENGAGE PROPERLY, THE SPRING MAY BE BROKEN - DO NOT CONTINUE CAGING PROCEDURES. (PAGE 2-12)

ALL PERSONS NOT INVOLVED IN THE COUPLING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY. (PAGE 2-14)

NEVER STAND BETWEEN THE PRIME MOVER AND TRAILER WHEN THE PRIME MOVER IS BEING BACKED UP TO THE TRAILER. SERIOUS INJURY OR DEATH MAY RESULT. (PAGE 2-14)

WALK AROUND THE TRAILER WHEN RAISING THE DROP LEG

WARNINGS

SECTIONS OF THE LANDING LEGS INSTEAD OF CLIMBING OVER OR CRAWLING UNDER THE TRAILER. (PAGE 2-15)

TRAILER AND PRIME MOVER MAY ROLL WHEN BRAKE IS RELEASED. TO PREVENT INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT, THE DRIVER MUST REMAIN IN THE CAB OF THE PRIME MOVER. (PAGE 2-16)

ALL PERSONS NOT INVOLVED IN UNCOUPLING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY. (PAGE 2-17)

WHEN TOWING THE EET WITH THE MTVR THE MTVR LOAD WILL BE FORWARD BIASED (I.E., LOADED AS FAR FORWARD AS POSSIBLE) AND THE EET LOAD WILL BE REARWARD BIASED (I.E. LOAD AS FAR BACK AS SAFELY POSSIBLE). THIS CONFIGURATION ENCOURAGES SAFE WEIGHT DISTRIBUTION BETWEEN THE TRUCK AND TRAILER. (PAGE 2-19)

IMPROPER LOAD PLACEMENT CAN HAVE A DETRIMENTAL EFFECT ON BRAKING, EVASIVE MANEUVERS, AND HANDLING CHARACTERISTICS OF A TRACTOR TRAILER VEHICLE COMBINATION, WHICH COULD RESULT IN INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT. (PAGE 2-19)

OPERATORS WILL USE GROUND GUIDES FOR ALL LOADING AND UNLOADING, ESPECIALLY AT NIGHT. (PAGE 2-19)

NORMAL PROCEDURES ARE TO LOAD/OFFLOAD EQUIPMENT OVER THE RAMPS WITH THE TRAILER COUPLED TO THE PRIME MOVER. USE EXTREME CAUTION IN CASES WHERE THE TRAILER'S STABILIZER LEGS ARE USED WHEN UNCOUPLED TO PREVENT EQUIPMENT DAMAGE AND/OR PERSONAL INJURY. (PAGE 2-21)

ENSURE THAT ALL PERSONNEL ARE CLEAR BEFORE RAISING OR LOWERING REAR LOADING RAMPS. RAMPS ARE HEAVY AND MAY CAUSE SERIOUS INJURY TO PERSONNEL. (PAGE 2-22)

ALL PERSONS NOT INVOLVED IN THE LOADING/UNLOADING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY. (PAGE 2-22)

DUE TO THE DIMENSIONS AND CENTER OF GRAVITY OF SOME LOADS, PROPER PROCEDURES MUST BE FOLLOWED WHEN LOADING AND UNLOADING EQUIPMENT TO PREVENT DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL. (PAGE 2-23)

ALWAYS USE A GROUND GUIDE WHEN LOADING OR UNLOADING THE TRAILER. IF THE TRAILER IS NOT CONNECTED TO THE PRIME

WARNINGS

MOVER, DO NOT ALLOW THE GROUND GUIDE ON OR NEAR THE TRAILER. (PAGE 2-23)

OPERATORS WILL USE GROUND GUIDES FOR ALL LOADING AND UNLOADING, ESPECIALLY AT NIGHT. ENSURE THAT TWO GROUND GUIDES ARE USED WHEN LOADING AND UNLOADING THE BHL DUE TO THE WIDTH OF TIRES. (PAGE 2-24)

IF THE TRAILER IS NOT CONNECTED TO THE PRIME MOVER ENSURE THAT THE REAR STABILIZER LEGS ARE DOWN AND LOCKED. (PAGE 2-24)

MOVEMENT (SLOSHING) OF LIQUID IN QUAD-CON DECREASES THE TRAILER STABILITY DURING TURNING AND OPERATIONS ON UNEVEN TERRAIN. FAILURE TO USE EXTREME CAUTION MAY RESULT IN OVERTURNING OF TRAILER CAUSING SEVERE INJURY OR DEATH TO PERSONNEL. (PAGE 2-25)

DO NOT STAND UNDER QUAD-CON CONTAINER DURING LOADING/OFFLOADING OPERATION SERIOUS INJURY OR DEATH MAY RESULT. (PAGE 2-25)

USE EXTREME CAUTION WHEN ALIGNING AND LOWERING THE QUAD-CON CONTAINER ONTO ISO TWIST LOCKS. HANDS AND FINGERS SHOULD BE KEPT CLEAR TO AVOID INJURY. PUSH ON ISO CONTAINER KEEPING HANDS AWAY FROM ISO LOCKDOWN POINTS, TO GUIDE CONTAINER ONTO LOCKS. (PAGE 2-26)

SOME COMPONENTS OF THE BRAKE SYSTEM ARE NOT RATED TO OPERATE CORRECTLY AT TEMPERATURES THAT ARE BELOW -40°F. DO NOT OPERATE THE EET IN TEMPERATURES THAT ARE COLDER THAN -40°F. (PAGE 2-33)

SAND AND LOOSE DIRT MAY CATCH IN RAMPS AND BECOME AIRBORNE WHEN RAMPS ARE RAISED. USE CAUTION WHEN RAISING RAMPS TO AVOID GETTING SAND OR DIRT IN EYES. (PAGE 2-34)

REMOVE POWER TO THE TRAILER PRIOR TO WORKING ON THE ELECTRICAL SYSTEM. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 2-37)

DO NOT RELEASE WINCH HANDLE UNLESS RATCHET BINDER IS PROPERLY ENGAGED. DO NOT DISENGAGE RATCHET UNLESS TENSION IS APPLIED TO HANDLE. FAILURE TO OBSERVE THIS WARNING COULD CAUSE THE HANDLE TO SPIN OUT OF CONTROL AND CAUSE PERSONAL INJURY. (PAGE 2-40)

RAISING THE TRAILER WITH THE LUG NUTS REMOVED COULD CAUSE

WARNINGS

PERSONAL INJURY. (PAGE 2-40)

ALWAYS USE JACK STANDS OR REAR STABILIZER LEGS TO SUPPORT THE TRAILER WHEN REMOVING A TIRE AND WHEEL ASSEMBLY. SERIOUS INJURY CAN RESULT IF THE JACK FAILS AND THE TRAILER IS NOT SUPPORTED. (PAGE 2-41)

TIRES WEIGH APPROXIMATELY 340 LBS. DO NOT STAND WHERE TIRE COULD FALL AND CAUSE PERSONAL INJURY. (PAGE 2-41)

ENSURE THAT THE TRAILER IS COUPLED TO THE PRIME MOVER OR PROPERLY SUPPORTED SO THAT THE LANDING LEG IS OFF THE GROUND. (PAGE 3-5)

RAMPS ARE HEAVY AND AWKWARD. USE CAUTION WHEN REMOVING AND HANDLING THEM TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT. (PAGE 3-12)

REMOVAL OF RAMP REQUIRES THE RAMP TO BE IN A NEAR VERTICAL POSITION TO REMOVE TENSION FROM THE RAMP HINGE SPRINGS. THE SPRING SHOULD BE LOOSE PRIOR TO REMOVAL OF RAMP. SERIOUS INJURY TO PERSONNEL MAY OCCUR IF THE RAMP IS REMOVED WHEN THE SPRING IS UNDER TENSION. (PAGE 3-12)

LOADING RAMPS ARE KEY STRUCTURAL MEMBERS OF THE TRAILER. IMPROPER REPAIR OF RAMPS COULD CAUSE FAILURE DURING LOADING/UNLOADING OF EQUIPMENT RESULTING IN DAMAGE TO EQUIPMENT OR INJURY TO PERSONNEL. (PAGE 3-12)

DO NOT RELEASE WINCH HANDLE UNLESS RATCHET BINDER IS PROPERLY ENGAGED. DO NOT DISENGAGE RATCHET BINDER UNLESS TENSION IS APPLIED TO HANDLE. FAILURE TO OBSERVE THIS WARNING COULD CAUSE THE HANDLE TO SPIN OUT OF CONTROL AND CAUSE PERSONAL INJURY. (PAGE 3-13)

RAMP IS HEAVY AND AWKWARD. USE CAUTION WHEN REMOVING AND HANDLING TO PREVENT INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT. (PAGE 3-13)

ALWAYS USE JACK STANDS OR OTHER FIELD EXPEDIENT MEANS TO SUPPORT THE TRAILER WHEN REMOVING A TIRE AND WHEEL ASSEMBLY. SERIOUS INJURY CAN RESULT IF THE JACK FAILS AND THE TRAILER IS NOT SUPPORTED. (PAGE 4-5)

DRY CLEANING SOLVENT IS BOTH TOXIC AND FLAMMABLE. AVOID PROLONGED BREATHING OF VAPORS. AVOID SKIN CONTACT. USE ONLY IN WELL VENTILATED AREA. KEEP AWAY FROM FLAME. (PAGE 4-8)

WARNINGS

PARTICLES BLOWN BY COMPRESSED AIR ARE HAZARDOUS. MAKE CERTAIN THE AIR STREAM IS DIRECTED AWAY FROM USER AND OTHER PERSONNEL IN THE AREA. TO PREVENT INJURY, USER MUST WEAR PROTECTIVE GOGGLES OR FACE SHIELD WHEN USING COMPRESSED AIR. (PAGE 4-9)

ALWAYS CHECK TIRE/RIM ASSEMBLY FOR PROPER COMPONENT SEATING PRIOR TO REMOVING FROM VEHICLE. (PAGE 4-12)

ALWAYS DEFLATE TIRE COMPLETELY BY REMOVING VALVE CORE BEFORE REMOVING TIRE AND RIM ASSEMBLY FROM VEHICLE, IF THE TIRE HAS BEEN RUN AT 80% OR LESS OF ITS RECOMMENDED OPERATING PRESSURE, OR WHEN THERE IS OBVIOUS OR SUSPECTED DAMAGE TO THE TIRE OR WHEEL. (PAGE 4-12)

ALWAYS REMOVE VALVE CORE AND DEFLATE TIRE COMPLETELY BEFORE ASSEMBLY OF COMPONENTS. (PAGE 4-12)

ALWAYS FOLLOW THE MOUNTING AND DEMOUNTING PROCEDURES OUTLINED. (PAGE 4-12)

ALWAYS USE SPECIALIZED TOOLS AS RECOMMENDED FOR MOUNTING AND DEMOUNTING OF TIRES. (PAGE 4-12)

NEVER LEAN, STAND OR REACH OVER TIRE/RIM ASSEMBLY DURING INFLATION. (PAGE 4-12)

NEVER HAMMER ON COMPONENTS OF AN INFLATED OR PARTIALLY INFLATED ASSEMBLY. (PAGE 4-12)

NEVER ATTEMPT TO UNSEAT BEADS OF AN INFLATED TIRE. (PAGE 4-12)

ALWAYS FOLLOW THE MOUNTING AND DEMOUNTING PROCEDURES OUTLINED AND USE SPECIALIZED TOOLS AS RECOMMENDED FOR MOUNTING AND DEMOUNTING OF TIRES. NEVER LEAN, STAND OR REACH OVER TIRE/RIM ASSEMBLY DURING INFLATION. NEVER HAMMER ON COMPONENTS OF AN INFLATED OR PARTIALLY INFLATED ASSEMBLY. (PAGE 4-13)

ALWAYS SELECT THE PROPER TIRE SIZE AND CONSTRUCTION TO MATCH THE MANUFACTURERS RIM OR WHEEL RATING AND SIZE. ALWAYS CHECK RIM DIAMETER TO BE SURE IT EXACTLY MATCHES RIM DIAMETER MOLDED ON TIRE. ALWAYS CLEAN AND INSPECT RIM AND ALWAYS BE SURE RIM COMPONENTS ARE PROPERLY MATCHED. (PAGE 4-13)

NEVER MOUNT OR USE DAMAGED TIRES, TUBES OR RIMS OR USE A RIM/WHEEL COMPONENT WHICH CANNOT BE IDENTIFIED. NEVER

WARNINGS

REWORK, WELD, HEAT OR BRAZE RIMS. (PAGE 4-13)

ALWAYS INSPECT INSIDE OF TIRE FOR LOOSE CORDS, CUTS, PENETRATING OBJECTS, OR OTHER CARCASS DAMAGE. TIRES WITH UNREPAIRABLE DAMAGE SHOULD BE DISCARDED. (PAGE 4-13)

ALWAYS BE SURE THAT RIM COMPONENTS ARE PROPERLY SEATED BEFORE INFLATING. (PAGE 4-13)

ALWAYS USE SAFETY CAGE OR OTHER EQUIVALENT RESTRAINING DEVICE WHEN INFLATING THE TIRE TO SEAT THE BEADS AND/OR INFLATING THE TIRE TO NORMAL OPERATING INFLATION PRESSURE. (PAGE 4-13)

ALWAYS INSPECT VALVE CORES FOR PROPER AIR RETENTION. REPLACE DAMAGED OR LEAKY CORES. (PAGE 4-13)

ALWAYS USE REMOTE INFLATION EQUIPMENT CONSISTING OF AN EXTENSION HOSE WITH A CLIP—ON CHUCK AND IN—LINE VALVE WITH GAUGE OR PRE—SET PRESSURE REGULATOR; OPERATOR MUST STAND CLEAR OF TRAJECTORY DURING INFLATION. (PAGE 4-13)

NEVER—INFLATE OR ADD INFLATION PRESSURE TO A TIRE THAT HAS BEEN FLAT OR SERIOUSLY UNDERINFLATED WITHOUT REMOVING AND CHECKING FOR TIRE OR RIM DAMAGE. (PAGE 4-13)

ALWAYS LUBRICATE WITH ONLY APPROVED TIRE MOUNTING LUBRICANT. NEVER USE ANTI—FREEZE, SILICONES OR PETROLEUM—BASE LUBRICANTS. (PAGE 4-14)

ALWAYS INFLATE TIRE TO TIRE MANUFACTURER'S RECOMMENDED COLD OPERATING PRESSURE. (PAGE 4-14)

BRAKES AND SPRINGS ARE UNDER TENSION. USE CAUTION WHEN REMOVING. INJURY MAY RESULT FROM IMPROPER REMOVAL OF BRAKE SHOES. (PAGE 4-17)

ENSURE TO USE CHOCK BLOCKS BEFORE WORKING ON BRAKES. (PAGE 4-17)

DRY CLEANING SOL VENT IS BOTH TOXIC AND FLAMMABLE. AVOID PROLONGED BREATHING OF VAPORS. AVOID SKIN CONTACT. USE IN WELL VENTILATED AREA. KEEP AWAY FROM FLAMES. (PAGE 4-17)

USE CARE WHEN INSTALLING SPRINGS. SPRINGS ARE UNDER TENSION AND WHEN RELEASED, MAY FLY OFF, CAUSING INJURY TO PERSONNEL. (PAGE 4-19)

BRAKES AND SPRINGS ARE UNDER TENSION. USE CAUTION WHEN REMOVING. INJURY MAY RESULT FROM IMPROPER REMOVAL OF

WARNINGS

BRAKE SHOES. (PAGE 4-20)

ENSURE TO USE CHOCK BLOCKS BEFORE WORKING ON BRAKES. (PAGE 4-20)

THE SPRING BRAKE CHAMBER CONTAINS A SPRING UNDER HIGH PRESSURE. TO PREVENT PERSONNEL INJURY OR DEATH, NEVER WORK DIRECTLY BEHIND THE SPRING BRAKE CHAMBER. IF CAGING BOLT WILL NOT ENGAGE PROPERLY, THE SPRING MAY BE BROKEN - DO NOT CONTINUE CAGING PROCEDURES. (PAGE 4-27)

REMOVE ALL POWER TO TRAILER PRIOR TO REMOVING THE LIGHTS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 5-17)

REMOVE ALL POWER TO TRAILER PRIOR TO REMOVING THE LED SIDE CLEARANCE LIGHTS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 5-18)

REMOVE ALL POWER TO TRAILER PRIOR TO MAKING ANY REPAIRS ON THE ELECTRICAL SYSTEM. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 5-19)

REMOVE ALL POWER TO TRAILER PRIOR TO MAKING ANY REPAIRS ON THE WIRING HARNESS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. (PAGE 5-19)

BEFORE PUTTING HAND TO HUB, HOLD HAND CLOSE TO HUB TO CHECK FOR EXCESSIVE HEAT RADIATION. HUB MAY BE HOT. THIS WILL PREVENT SKIN BURNS CAUSED BY HOT METAL. (PAGE D-5)

CAUTIONS

If the inside of the spring brake chamber is clogged with mud, sand, or dirt, do not attempt to cage or repair the spring brake chamber, unless the chamber can be cleared. (PAGE 2-11)

To prevent damage to equipment, two people should be utilized when coupling; the first person in the prime mover cab and the second acting as a ground guide.(PAGE 2-14)

Sand shoes on landing legs may need additional ground pad in soft soil conditions to keep the shoes from sinking. (PAGE 2-17)

To prevent damage to equipment, two peoplel should do uncoupling, the first person in the prime mover cab and the second acting as a ground guide. (PAGE 2-17)

When loading or unloading equipment, ensure that the edges of the loading ramps are on even, level ground that allows full ground contact along the edges of the ramps. Failure to have full ground contact across the edges of the ramps will cause damage to the trailer. (PAGE 2-22)

Maximum load capacity of rear loading ramps is 20,000 lbs. Exceeding the maximum load capacity will cause damage to the trailer and equipment being loaded. Tracked vehicles will not be loaded across the rear ramps. (PAGE 2-22)

Do not conduct operations with equipment that is too wide to be properly transported on the trailer. (PAGE 2-23)

When securing cargo or equipment, use only the tie down points provided for that purpose. (PAGE 2-23)

Over tightening the load binder could cause damage to the ramp rod. (PAGE 2-24

Do not tow, pull, or push trailer by the rear bumper. Damage to trailer may result. (PAGE 2-34)

While removing the safety chain bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-4)

While installing the safety chain bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-5)

While removing the trailer lift, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may

CAUTIONS

cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-9)

While installing the trailer lift, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These Procedures should only be Performed by or under the supervision of trained personnel. (PAGE 3-9)

While removing the ramp hinge bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-15)

While installing the ramp hinge bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. these procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-15)

While removing the ramp tie down assemblies, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-17)

While installing the ramp tie down assemblies, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel. (PAGE 3-17)

Excess adjustment may cause damage to internal clutches. (PAGE 4-6)

Do not pry against tone ring or sensor block. (PAGE 4-7)

Do not dry bearings with high pressure compressed air. Spinning dry bearings will cause damage. Use compressed air that has been filtered for moisture only. Unfiltered air will not completely dry parts and may allow corrosion. (PAGE 4-9)

Hub must be carefully aligned on the spindle when installed and securely supported throughout procedure. Failure to align and support hub may cause damage to the seal. (PAGE 4-10)

Do not get grease, oil, solvent, or fingerprints on brake lining surfaces. This will cause glazed brake linings and uneven braking. (PAGE 4-18)

CAUTIONS

When installing camshaft seals, the seal on the slack adjuster side is installed with seal facing into the spider. This allows grease to purge outside the brake assembly when greasing the camshaft bushing. It also aids to avoid damage of the seal lips when camshaft is installed. (PAGE 4-21)

Ensure eccentric/alignment bolt does not turn and change alignment during nut torque. (PAGE 4-39)

Do not use a battery charger to power the ABS. (PAGE 5-3)

Before disconnecting anything remove electrical power and air pressure from the system. (PAGE 5-3)

Extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. Welding procedures should only be performed by or under the supervision of trained personnel. (PAGE 6-3)

Extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. Welding procedures should only be performed by or under the supervision of trained personnel. (PAGE 6-4)

If replacement capscrews are of a higher grade than originally supplied, use torque specifications for that placement. This will prevent equipment damage due to over torquing. (PAGE F-1)

List of Acronyms

AAL	Additional Authorized List
ABS	Anti-Lock Brake System
ABS ECU	ABS Electronic Control Unit
AWS	American Welding Standards
BHL	Backhoe Loader
CARC	Chemical Agent Resistant Coating
CG	Center of Gravity
COEI	Component of End Item
CONUS	Continental United States
DLA	Defense Logistics Agency
EET	Engineer Equipment Trailer
EMI	Electromagnetic Interference
GVW	Gross Vehicle Weight
ISO	International Standards Organization
IVEC	Inter-Vehicular Electrical Cable
LED	Light Emitting Diodes
LOM	Level of Maintenance
LRTF	Light-Capability Rough Terrain Forklift
MCLB	Marine Corps Logistics Base
MCO	Marine Corps Order
MILSTRIP	Military Standard Requisitioning Issue Procedures
MPS	Maritime Pre-Positioning Ship
MTMCTEA	Military Traffic Management Command, Transportation Engineering Agency
MTVR	Medium Tactical Vehicle Replacement
NSN	National Stock Number
OCONUS	Outside the Continental United States
PM/ES	Program Manager, Engineer Systems
PMCS	Preventative Maintenance Checks and Services
QTY	Quantity
QUAD-CON	Quadruple Containers
SASSY	Supported Activities Supply System
SL-3	Stock List-3
SMR	Source, Maintenance, and Recoverability
TM	Technical Manual
U/I	Unit of Issue
WIR	Recoverable Item Report

CHAPTER 1
GENERAL INSTRUCTIONS

Section I. GENERAL DESCRIPTION AND SPECIFICATION DATA

1-1. SCOPE

a. General. This Technical Manual (TM) is for use in operating and performing maintenance on the MTO20A1 Engineer Equipment Trailer (EET) (Figure 1-1). This TM contains operation instructions, Organizational and Intermediate Levels of Maintenance (LOM) instructions, repair parts list, can components lists.

b. Model Number. MTO20A1.

c. Nomenclature. Engineer Equipment Trailer

d. Purpose of Equipment. The EET identifies a requirement to equip forces with the required mobility resources. The primary purpose of the EET is to move/transport the Backhoe Loader (BHL), the Light-Capability Rough Terrain Forklift (LRTF) or ammunition loads . The BHL is a critical asset that provides ground combat element with a light multi-purpose excavating capability. The LRTF is essential for handling and movement of ammunition, small container, and cargo within artillery units. The EET will haul the BHL or the LRTF to reduce transit time and vulnerability to enemy action.

Figure 1-1. Engineer Equipment Trailer (EET)

WARNING

DO NOT EXCEED THE LOAD AND SPEED LIMITATIONS OF THE TRAILER.

Special Limitations on Equipment. The trailer can be towed over improved roads (graded gravel) with loads up to 10 tons. The design, configuration, and capability of the trailer permit off-road use. Table 1-1 provides maximum speeds for each road type. The trailer should be operated only after being serviced and equipped for existing climatic conditions.

Table 1-1. Speed Limits

Speed Limits	
25 mph	Cross Country
35 mph	Improved (Graded) Roads
45 mph	Highway
55 mph	Maximum Highway Speed (unloaded)

1-2. EQUIPMENT CAPABILITIES AND FEATURES

a. Capabilities.

(1) This trailer is designed to transport the BHL or the LRTF. The trailer is capable of hauling 10 tons on highways, improved roads (graded gravel), and off roads.

(2) The prime mover for the trailer is the Medium Tactical Vehicle Replacement (MTVR) family of 7-ton trucks.

b. Features.

(1) Highway payload 10 tons at 45 mph.

(2) Improved road (graded gravel) payload 10 tons at 35 mph.

(3) Off road payload 10 tons at 15 mph.

(4) Quadruple Containers (QUAD-CON) container load bed configuration capable.

(5) Spare tire on drawbar of trailer.

(6) Removable and adjustable ramps.

(7) Davit with hand winch for lifting the spare tire and ramps.

(8) Two integrated toolboxes. The forward toolbox located on the drawbar is for storage of the davit and the chock block set. The rear toolbox located on the beavertail is for storage of the ratchet chain binders and chains.

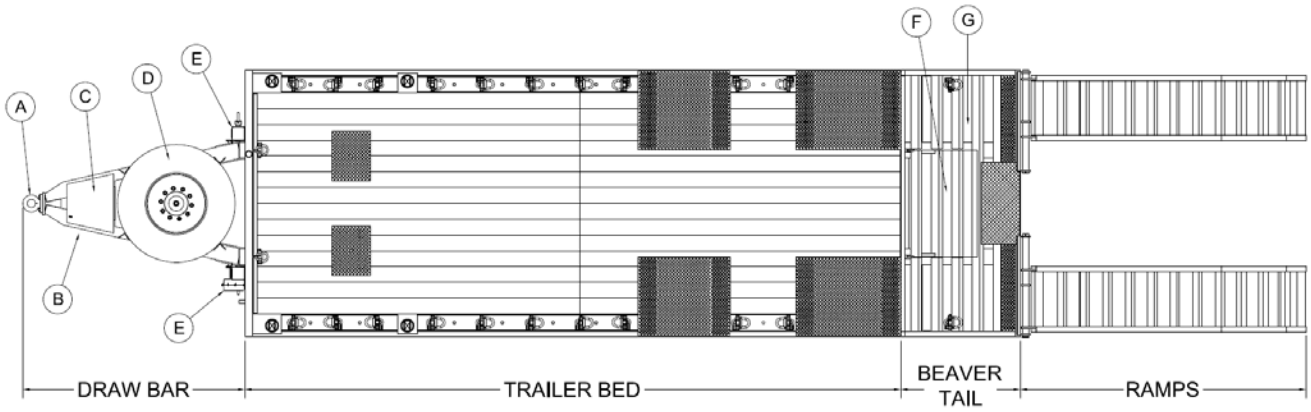
(9) Prime mover supplies air pressure and control of Anti-Lock Brake System (ABS) equipped brakes.

(10) Two position lunette that couples to the prime mover pintle hook.

(11) Forward landing legs to support the trailer.

(12) Rear stabilizer legs for uncoupled loading and unloading requirements.

1-3. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



A LUNETTE
B DATA PLATE
C DRAWBAR TOOL BOX
D SPARE TIRE ASSEMBLY
E LANDING LEGS
F BEAVERTAIL TOOL BOX
G STABILIZER LEGS

Figure 1-2. EET Trailer Major Components

a. Data Plates. Data plates are located on the front left drawbar frame and provide loading and manufacturer's data. See Figure B-6.

b. Spare Tire Assembly. The spare tire assembly (Figure 1-3) is a component of the trailer and is located on the drawbar (front) of the trailer. The spare tire is retained on the trailer by the retaining bolt assembly (2) and retaining bar (1), centered in the spare tire brace (3).

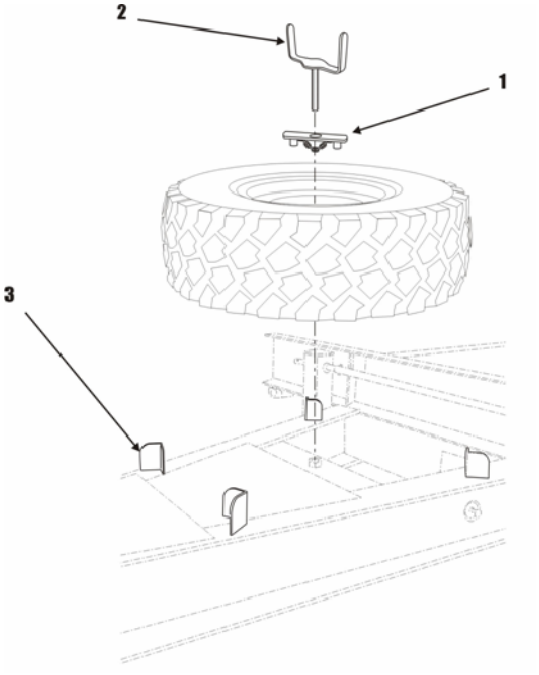


Figure 1-3. Spare Tire Assembly Location

c. Landing Legs. Two landing legs (Figure 1-4) are used when the trailer is uncoupled from the prime mover. The two speed crank handle located on the forward driver's side of the trailer extends or retracts the telescoping landing legs together. The telescoping legs can also be extended and locked in several different positions by a lock-pin on each leg.

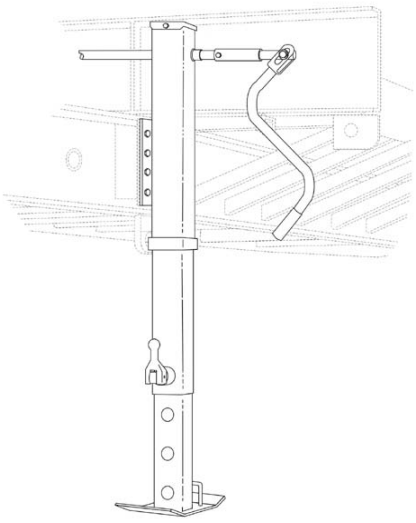


Figure 1-4. Landing Legs

d. Ramps. The ramps (Figure 1-5) fold down for loading and unloading equipment and vehicles. The ramps are adjustable capable of sliding closer or farther apart depending on the width of the equipment being loaded.

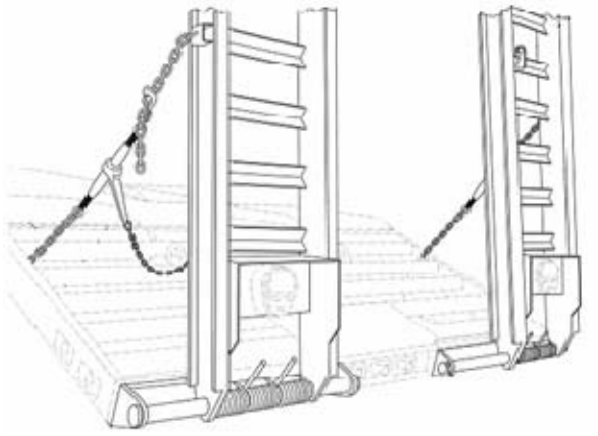


Figure 1-5. Ramps

e. Stabilizer Legs. Two rear stabilizer legs (Figure 1-6) are used when the trailer is uncoupled from the prime mover and a payload is loaded or unloaded. The stabilizer legs are rotated 90 degrees from the storage position with telescoping legs that can be locked in several different positions by a lock pin on each leg.

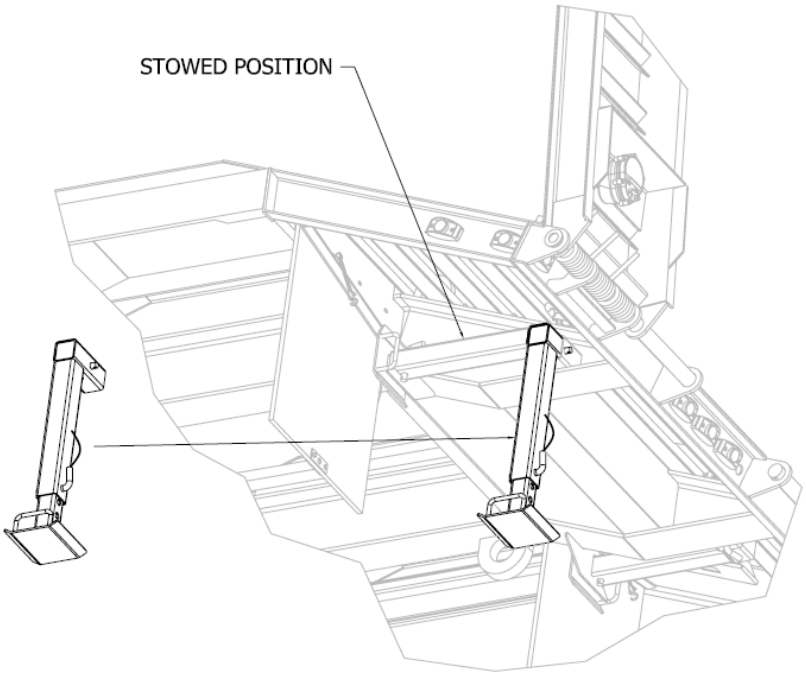


Figure 1-6. Stabilizer Legs

f. Cargo Tie Down Points. Twenty-six (26) D-link assembly cargo tie downs (Figure 1-7) are provided on the trailer for use in the tie down of payload. Ten (10) of these tie down points are located on each side of the load bed, two are on the front edge of the load bed, and four are located on the beavertail at the rear of the trailer.

Figure 1-7. Cargo Tie Down

g. Trailer Tie Down Points. Four (4) trailer tie down lugs are available underneath the trailer for rail, air, or Maritime Pre-Positioning Ship (MPS) transport (Figure 1-8). Trailer may be stacked or transferred with payload during MPS transportation, but not during rail or air transportation.

h. Trailer Lift Points. Four lifting lugs (Figure 1-8) are available to lift an unloaded trailer. Two lifting lugs are on the beavertail and two are recessed with a cover on the forward frame bed. The lifting lugs may also be used to secure payloads.

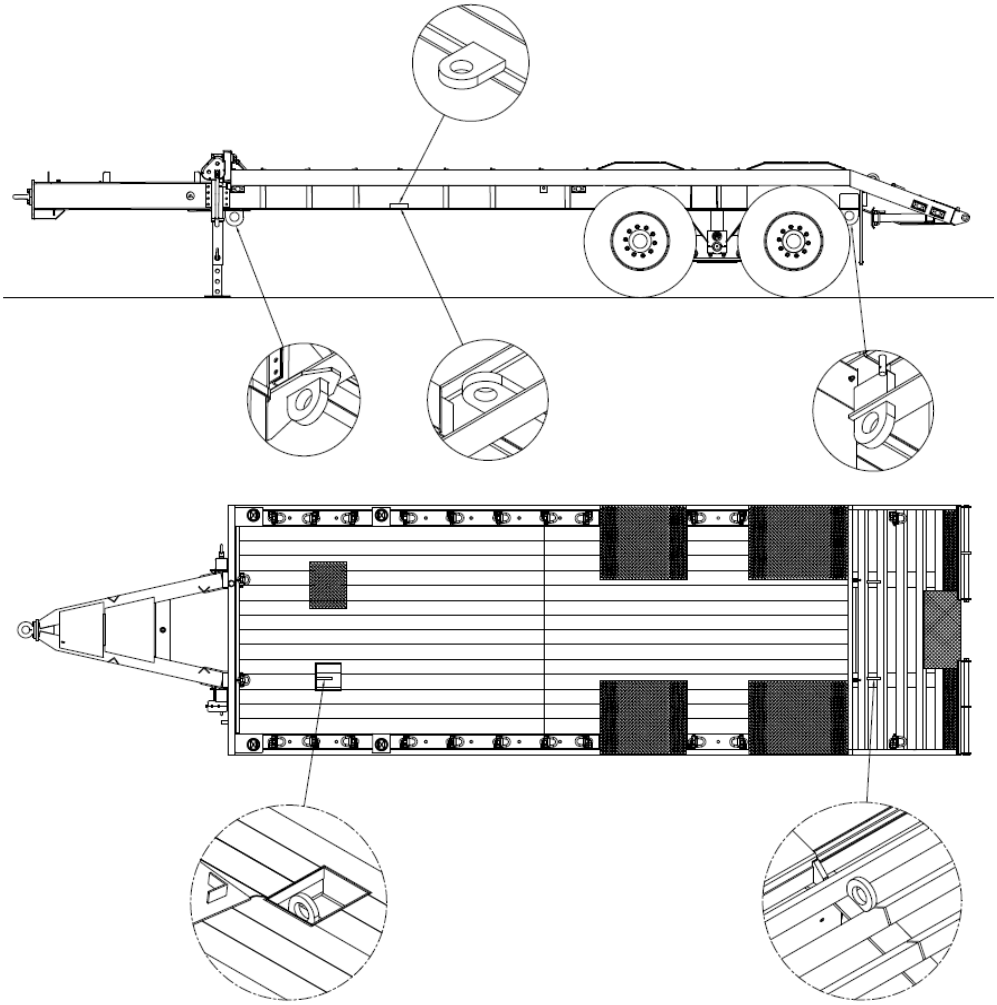


Figure 1-8. Trailer Tie Downs and Lift Points

i. Lights. Two combination stop, turn, taillight, and blackout lights (Figure 1-9) are located at the rear of the trailer. Red clearance lights are located on the back corners of the trailer, and three red clearance lights are located at the rear center of the trailer. Amber clearance lights are located on each side of the drawbar, each corner on the front of the trailer, and on each side near the mid-point of the trailer. An ABS warning indicator light is located at the rear diver's side of the trailer.

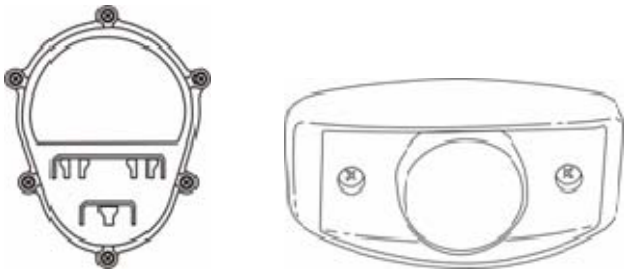


Figure 1-9. Combination Light and Clearance Light/ABS Light

j. Brake System. The trailer is equipped with an S-cam air brake system. This includes the service brakes for normal operation of the brakes and also an emergency spring brake that will lock the brakes in the event air pressure is lost. The ABS comes standard with the trailer. Sensors monitor the rotation of the wheel when the service brakes are applied. If any of the wheels begin to lock up, the ABS will automatically adjust the pressure to the brake to keep the rotation of all wheels equal and help prevent the trailer from sliding.

1-4. EQUIPMENT DATA

a. Trailer.

Overall Dimensions	
Length	30 ft 11 1/2 in
Width	8 ft 1 in
Deck Height	4 ft 1 in
Total Height with Backhoe Loader	12 ft 9 in
Beavertail	3 ft 6 in
Ramps	
Quantity	2
Length	8 ft
Type	Adjustable (side to side)
Drawbar	6 ft 8 in
Ground clearance	
Frame rail	2 ft 10 in
Axle	11 3/4 in
Deck Dimensions	
Length	19 ft 10 in
Width	8 ft 1 in
Height (with BHL)	3 ft 11 in
Height (without BHL)	4 ft 9 in
Weights	
Curb (no load)	11,035 lbs
Maximum cargo	20,000 lbs
Gross (loaded)	31,035 lbs
Weight Distribution	
Axles (combined)	
Empty	9,860 lbs
Loaded, max	27,660 lbs
Lunette	
Empty	1,800 lbs
Loaded, max	4,000 lbs

b. Axles (combined).

Type	Q Style 16 1/2 x 7"
Quantity	2

Manufacturer.....Dexter Axle Company
Capacity .....27,000 lbs

c. Wheel Bearings.

Type ..... Single Row Taper Bearing
Manufacturer (cone).....Dexter Axle Company
Manufacturer (cup) ..... Dexter Axle Company

d. Hub Drums.

Type ..... Outboard Drum, Hub Piloted
Manufacturer.....Dexter Axle Company

e. Wheels.

Type ..... 1 Piece
Manufacturer..... Accuride
Rim type…….....Tubeless

f. Tires.

Manufacturer.....Michelin
Quantity.....5
Size .....425/65R 22.5 LR L
Type ..... XZL

g. Tire Air Pressure.

Highway……75 psi
Improved Roads……..75 psi
Off Roads……75 psi

h. Air Brake System.

Type ..... S-cam Brake
Brake Shoes .....16 ½ x 7, Q-Style
Actuation.....Air

i. Electrical Item.

Lights .....24 volt
ABS.....24 volt

j. Suspension.

Type ..... Walking, Single Point
Manufacturer.....Ridewell Corporation

k. Speed.

Maximum Highway
10-ton load…….. 55 MPH
Highway
10-ton load…….. 45 MPH
Improved roads (graded gravel)
10-ton load…….. 35 MPH
Off roads
10-ton load…….. 15 MPH

1-5. PARTS SUPPORT INFORMATION

a. Ordering Parts.

(1) The Defense Logistics Agency (DLA) is the source of supply for all parts.

(2) Parts will be ordered through the current Marine Corps Supply System.

(3) Military Standard Requisitioning (MILSTRIP)/Issue Procedures and Supported Activities Supply System (SASSY) will be used.

1-6. COMPONENTS AND STOCK LIST-3

a. General. Components and accessories designed for use with the EET are classified by one of the three Supply Support categories. This determines whether the item is optional, maintained by the using unit, or required to stay with the trailer. This is particularly important when the trailer is transferred to another unit or command. See Appendix A, Components List, for items and illustrations by category.

b. Supply Support Categories.

(1) Supply System Responsibility. A list, in alphabetical sequence, of items that are furnished with and must be turned in with the end item. Any item requiring replacement is the responsibility of the holding organization or using unit.

(2) Collateral Material. A list, in alphabetical sequence, of items that are supplied with the initial issue of the end item and are retained by the unit. The “9999-00-000-0000” NSN shown under the heading of “COLLATERAL MATERIAL,” is for control within the distribution system only, and is not authorized for requisitioning purposes.

(3) Using Unit Responsibility. A list, in alphabetical sequence, of items that will not be issued with the end item. They must be requisitioned, as required, through the supply system by the using unit or holding organization.

Section II. PREPARATION FOR USE

1-7. SERVICE UPON RECEIPT

The following services are to be performed by the operator when the trailer is received:

a. Note any missing or damaged parts or components and report them to the appropriate maintenance personnel.

b. Conduct an inventory to determine that all required tools, equipment, accessories, and publications (Appendix A) are with the trailer and are serviceable.

c. If stowed, replace loading ramps in accordance with paragraph 3-11.

Section III. PREPARATION FOR STORAGE AND SHIPMENT

1-8. STORAGE INSTRUCTIONS

The following procedures should be followed prior to placing the EET in administrative storage:

a. Perform annual Preventative Maintenance Checks and Services (PMCS) in accordance with the instructions included in Appendix D. Conduct repairs and/or order appropriate parts.

b. Clean the trailer to remove dirt, oil, grease, and other debris.

c. Remove rust and apply paint or other protective compounds to any exposed metal surfaces.

d. Clean and preserve all SL-3 items that will remain with the trailer.

e. Drain air from the air reservoir using the remote petcock lanyard.

f. When possible, store trailer on landing legs.

1-9. SHIPMENT INSTRUCTIONS

The following procedures should be followed for shipment of the EET:

a. Conduct the storage procedures detailed in steps (a) through (f), paragraph 1-8.

b. Securely stow all SL-3 items in the drawbar and beavertail toolboxes.

c. Load the EET onto an appropriate transporter and properly secure the trailer. See paragraph 2-25 for further instructions.

Section IV. DEMOLITION TO PREVENT ENEMY USE

1-10. GENERAL

Destruction of the trailer is the last resort to prevent the enemy from capturing trailers that must be abandoned in a combat zone.

1-11. DEMOLITION TO RENDER EQUIPMENT INOPERATIVE

a. Destroy important components with a sledge hammer, axe, tank bar, cutting torch or any other similar tool.

b. Cut or puncture tires and air lines.

c. Remove caging tools from brakes.

CHAPTER 2
ORGANIZATIONAL OPERATING INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

2-1. GENERAL

The EET is equipped with rear loading ramps, air brakes, spring/beam suspension, and has a 10 ton payload capability. The primary mission of the EET is to transport the BHL, LRTF and ammunition loads using the MTVR family of vehicles.

2-2. OPERATION OF EET SYSTEMS

a. Loading Ramps.

(1) Equipment and vehicles can be loaded using the loading ramps with the trailer coupled to the MTVR or uncoupled using the stabilizer legs located at the rear of the trailer.

(2) The loading ramps are secured by a chain and load binder restraint system in the upright and stowed position as far to the side of the trailer as possible (Figure 2-1). Springs are located on the hinge pin to assist in controlled raising and lowering of the ramps. The ramps are adjustable to accommodate various vehicle widths. To minimize damage, the ramps should only be used for loading rubber tired vehicles.

Figure 2-1. Loading Ramps in the Upright and Stowed Position

b. Air Brake System.

(1) General. Constant air pressure from the prime mover is routed through the supply (red/emergency) air line, to the service reservoir priority valve, and then to the air reservoir and spring brake chambers. When the prime mover service brakes are applied, air is routed through the control (blue/service) air line to the priority valve and then to the relay valve. The ABS relay valve releases reservoir air to the service brake chambers for brake application. Air pressure pushes the automatic slack adjusters forward and rotates the S-cams. This forces the brake shoes

against the brake drum. When the prime mover brake is released, air is vented and the trailer brakes are released.

(2) ABS Relay Valve (Figure 2-2). Provides brake application by releasing reservoir air to the brake chambers. Brake application in the prime mover signals the relay valve (via the control line) to open and allow air from the reservoirs to activate the service brakes.

Figure 2-2. Relay Valve

(3) Spring Brake Control Valve (Figure 2-3). Functions to charge the trailer reservoir with air, apply and release the parking brake, and apply the emergency brakes in the event of a catastrophic loss of air.

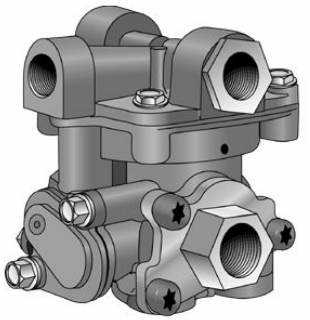


Figure 2-3. Control Valve

(4) Spring Brake Chambers. Application of air moves the piston and the push rod forward to apply the brakes. Release of air allows the spring to return the piston and the push rod to the spring brake chamber.

(5) Automatic Slack Adjuster. Compensates for brake wear and maintains constant braking force.

(6) Brake Assembly (Figure 2-4). When air is supplied to the service brake chamber, the push rod moves the automatic slack adjuster, which turns the S-cam. The S-cam moves the brake shoes outward, forcing them against the inside of the brake drum.

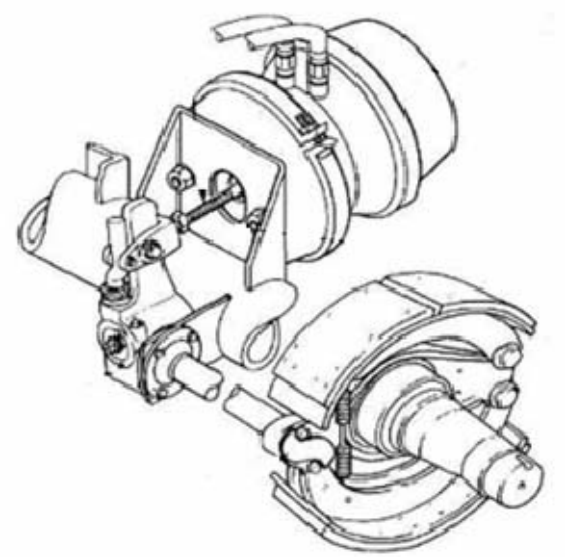


Figure 2-4. Brake Assembly

c. Suspension System. The suspension system has an equalizing beam and individually jointed steel springs that produce a stable ride combined with independent axle articulation. The suspension is designed to maintain nearly equal loads on each wheel as it articulates over rough terrain.

d. Wheels and Hubs. The trailer is equipped with hub piloted wheels, which are a standard commercial design using a tight tolerance between the wheel center opening and the hub in order to center the wheel. The wheel is held in place by one flange nut per stud. The hubs use an ABS. The tone ring machined inside the hub works with an ABS sensor.

e. Lighting System. Electrical power for the trailer is supplied by the prime mover. The EET operates on a straight 24 volt system. All Light Emitting Diodes (LED) lights are 24 volt lights.

f. Landing Legs. Landing legs are provided to support the trailer loaded or unloaded when uncoupled from the prime mover.

g. Stabilizer Legs. Stabilizer legs are positioned at the rear of the trailer to provide support when loading or off-loading with the trailer uncoupled from the prime mover.

Section II. CONTROLS AND INSTRUMENTS

2-3. GENERAL

The purpose of this section is to familiarize the operator and maintenance personnel with the EET. The brief descriptions provided in the figures are designed to provide a basic knowledge of the function and location of the various controls and components. The figures provide information pertaining to the nomenclature and function of the various controls and components of the trailer. The figures provide illustrations of these controls and components.

2-4. FUNCTION OF CONTROLS AND COMPONENTS

a. Air System Controls and Components

(1) Air Reservoir (Figure 2-5) stores trailer air supply.

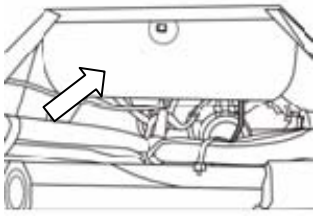


Figure 2-5. Air Reservoir

(2) Air Reservoir Remote Petcock Lanyard (Figure 2-6) provides a convenient point to drain air from the air reservoir. The lanyard is located on the driver's side of the trailer between the two axles just below the trailer bed.

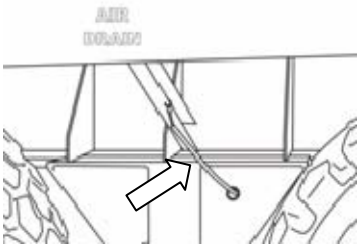


Figure 2-6. Remote Petcock Lanyard

(3) Spring Brake Release (Hostler) Valve (Figure 2-7) is used to release the brakes when the trailer is uncoupled from the prime mover and has air in the system (75 psi). This valve is located on the driver's side of the trailer drawbar.

Figure 2-7. Spring Brake Release Valve

b. Tie Down and Accessory Items

(1) Cargo Tie Downs (D-Link Assembly) (Figure 2-8) provides tie down points for securing loads.

Figure 2-8. Cargo Tie Down

(2) Chain Assemblies (Figure 2-9) are used to secure loads to trailer.

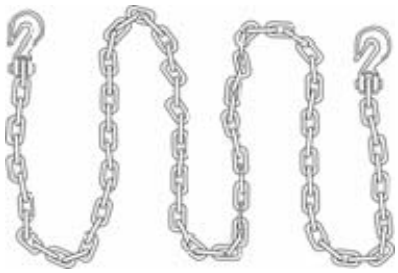


Figure 2-9. Chain Assemblies

(3) Load Ratchet Binders (Figure 2-10) tighten chains used to secure loads to trailer.

Figure 2-10. Load Ratchet Binders

(4) ISO Container Twist Lock (Figure 2-10) is the attachment point on trailer for container lock.

Figure 2-11. Trailer Twist Lock

(5) Trailer Lifts (Figure 2-12) are the attachment points for sling hoist. There are four lift points, two located on the forward section of the trailer bed, and two located on the top of the beavertail.

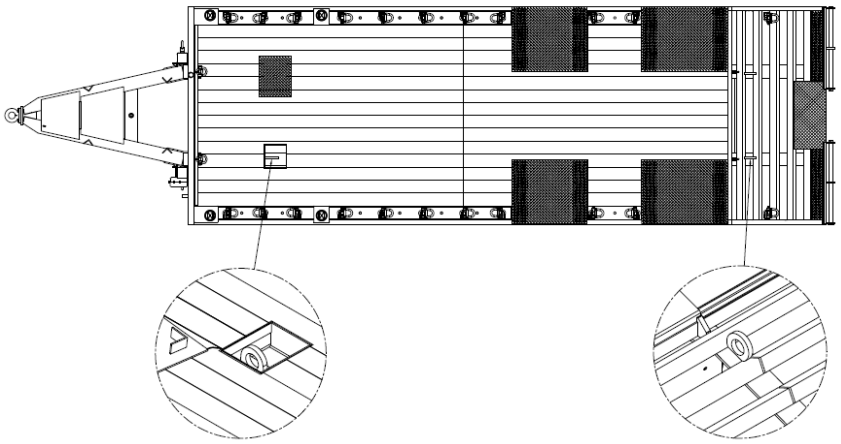


Figure 2-12. Trailer Lifts

(6) Trailer Tie Downs (Figure 2-13) are used to secure the trailer to a rail transport or MPS. There are four tie down points, two located on the trailer frame underside just behind the landing legs and two at the rear of the trailer under the beavertail.

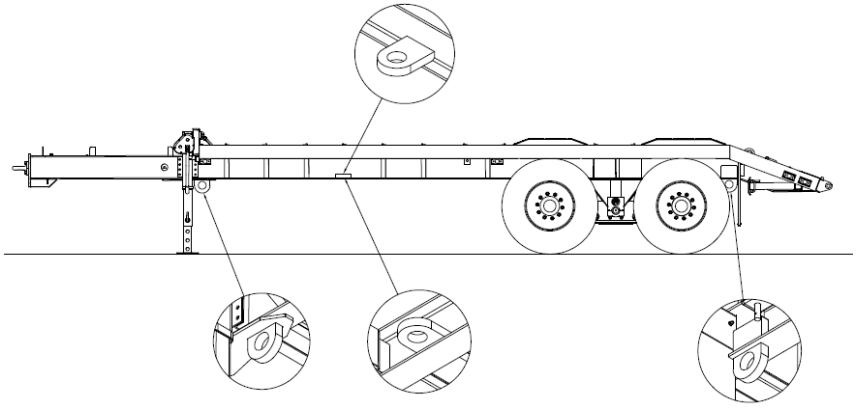


Figure 2-13. Trailer Tie Downs

(7) Spare Tire Tie Down Assembly (Figure 2-14) secures spare tire on the drawbar.

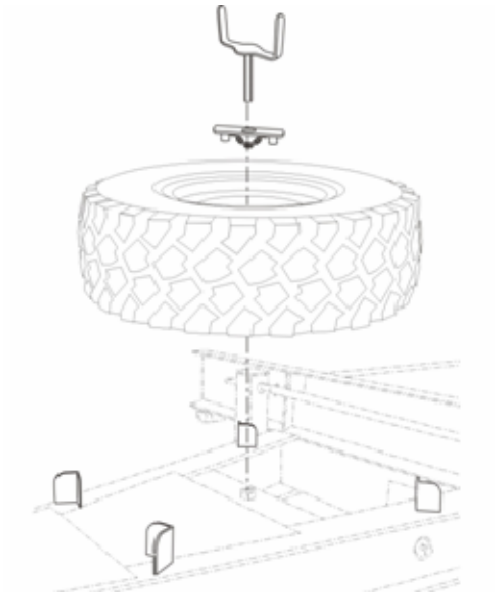


Figure 2-14. Spare Tire Tie Down Assembly

c. Couplings and Connectors.

(1) Lunette Eye (Figure 2-15) secures trailer to the pintle hook of prime mover. The lunette has two positions for laden and unladen primer mover.

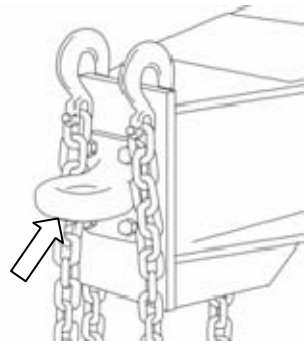


Figure 2-15. Lunette Eye

(2) Gladhands (Figure 2-16) connect to the prime mover to supply air for the trailer brakes.

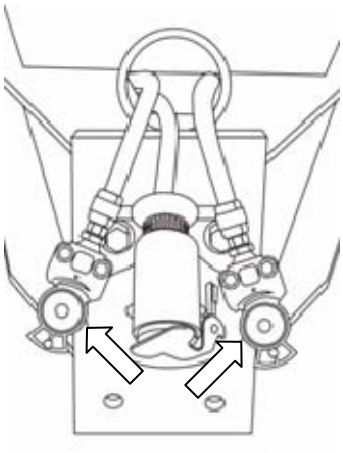


Figure 2-16. Gladhands

(3) Electrical Connector (Figure 2-17) is the connection point for the 24 volt inter-vehicular electrical cable from prime mover.

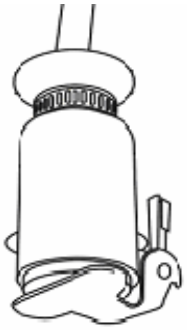


Figure 2-17. Electrical Connector

(4) Safety Chain and Hook (Figure 2-18) connects to the prime mover to support the trailer in the event the lunette or pintle hook fails.

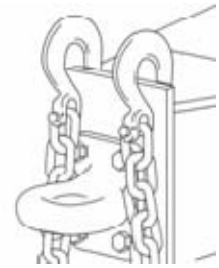


Figure 2-18. Safety Chain and Hook

Section III. OPERATING PROCEDURES

2-5. OPERATION

a. General.

(1) The EET, with its prime mover, will have different operational characteristics based on gross weight, differences between loaded and unloaded weight, and suspension characteristics. Safe operating limits are affected by the interaction of the vehicle characteristics, load, road surface, weather, driver skill, and vehicle speed.

(2) Before operating the trailer, ensure that all the operating procedures contained in this manual have been read and fully understood.

b. Pre-Trip Inspection. Certain items should be inspected prior to each trip. Appropriate procedures for Organizational PMCS (Appendix D) will be completed prior to operating the EET.

c. Permits/License.

(1) The license is on the prime mover.

(2) Once a driver is licensed on the prime mover, they are qualified to tow anything that is authorized to be towed behind the prime mover.

d. Driving.

(1) General. When driving the prime mover and trailer, the overall length must be kept in mind, both when passing other vehicles and when turning. Because the unit pivots at the pintle hook, backing is also affected.

(2) Road Surfaces. Uneven terrain, steep grades, crowned roads, and unimproved road surfaces can introduce forces that will make vehicle handling difficult. Even a vehicle that is properly maintained and loaded can be hazardous when excessive speed and certain road conditions are combined.

(3) Grades. Operating on grades requires caution. Use the same gear in descending a long grade as when ascending. Gear selection should be made before descending a grade to

minimize the chance of a missed shift. Avoid excessive use of brakes on long down grades in order to maintain air pressure and prevent overheating of the brakes.

(4) Side Slopes. This trailer is not designed to operate on excessive side slopes. The trailer can safely operate, with or without payload, on side slopes commonly encountered on highways or improved roads.

(5) Turning. Allow for extra turning radius when turning corners. The trailer wheels will follow a track that is inside the radius of the prime mover wheels. For right turns, drive about halfway into the intersection and then cut sharply to the right. The forces affecting the stability of a tractor-trailer combination are increased during turning, the smaller the radius, the greater the force trying to pull the vehicle over. Therefore, the tighter the curve, the slower the speed must be in order to avoid a rollover.

e. Stopping. In normal operation, when the driver applies the brakes, the prime mover and the trailer brakes are applied at the same time. Brake pressure should be applied gradually and smoothly. The trailer brakes may be applied separately by using the trailer hand brake control lever in the prime mover. Extreme caution should be exercised when using only the trailer brakes. Some benefit may be gained on slippery surfaces by slowly applying the trailer brakes before the prime mover brakes, reducing the possibility of jackknifing the trailer. However, it is very dangerous to use only the trailer brakes on a long downgrade. Doing so will cause the trailer brakes to heat up and fade. The prime mover brakes alone will not be able to stop the combined vehicle load. Selecting a lower gear before beginning a long downgrade is the safest, most effective way to maintain control of the vehicle combination.

WARNING

DO NOT ENGAGE ENGINE BRAKE WHEN TRAILER IS COUPLED TO THE PRIME MOVER.

f. Parking. When the prime mover and the trailer are to be parked and left unattended, set the parking brake on the prime mover and the trailer.

g. Backing.

WARNING

VISIBILITY FROM THE PRIME MOVER IS SIGNIFICANTLY REDUCED WHEN BACKING, WHETHER THE TRAILER IS LOADED OR NOT. PROPER PROCEDURES MUST BE FOLLOWED AND EXTREME CAUTION USED WHEN BACKING TO PREVENT DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL.

(1) When backing, use the assistant driver as a ground guide. Adjust rear view mirrors before backing. Use slow speed and extreme caution when backing this combination.

h. Caging the Brakes.

WARNING

CAGING THE BRAKES DISABLES THE SPRING (PARKING/ EMERGENCY) BRAKE. WHEN THE BRAKES HAVE BEEN CAGED, THE TRAILER SHOULD ONLY BE MOVED UNDER EMERGENCY CIRCUMSTANCES AND THEN ONLY WITH EXTREME CAUTION AND AT VERY LOW SPEEDS.

WARNING

THE SPRING INSIDE THE SPRING BRAKE CHAMBER IS UNDER VERY HIGH PRESSURE. DO NOT ATTEMPT TO REMOVE THE PERMANENT CLAMP ON THE PRESSURE SIDE OF THE SPRING BRAKE (END CAGING BOLT IS INSERTED). FAILURE TO TREAT THE SPRING BRAKE CHAMBER WITH CAUTION MAY RESULT IN SERIOUS INJURY OR DEATH.

NOTE

This procedure is used to manually release the brakes in the event that the air supply to the trailer has been lost or interrupted. This procedure should be performed only under extreme circumstances when the vehicle must be moved.

(1) Place blocks under trailer wheels to prevent trailer from rolling during procedure.

(2) Remove the dust cover (1) from the caging bolt keyhole (2) in the center of the spring brake chamber (3) (Figure 2-19).

CAUTION

If the inside of the spring brake chamber is clogged with mud, sand, or dirt, do not attempt to cage or repair the spring brake chamber, unless the chamber can be cleared.

(3) Visually inspect the inside of the spring brake chamber (3) for mud, sand, or dirt (Figure 2-19).

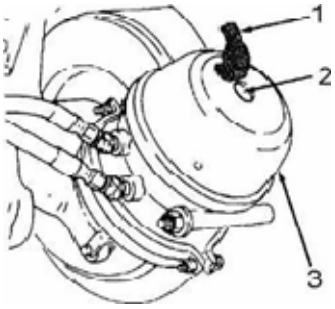


Figure 2-19. Spring Brake Chamber

(4) Remove nut (1) and washer (2) from the side of the spring brake chamber (Figure 2-20). Remove caging bolt (3).

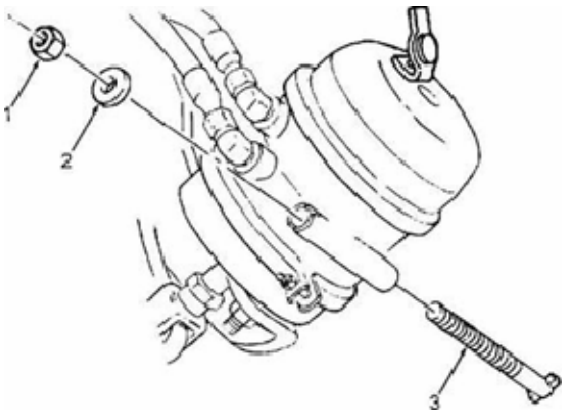


Figure 2-20. Caging Procedure Preparation

WARNING

THE SPRING BRAKE CHAMBER CONTAINS A SPRING UNDER HIGH PRESSURE. TO PREVENT PERSONAL INJURY OR DEATH, NEVER WORK DIRECTLY BEHIND THE SPRING BRAKE CHAMBER. IF THE CAGING BOLT WILL NOT ENGAGE PROPERLY, THE SPRING MAY BE BROKEN - DO NOT CONTINUE CAGING PROCEDURES.

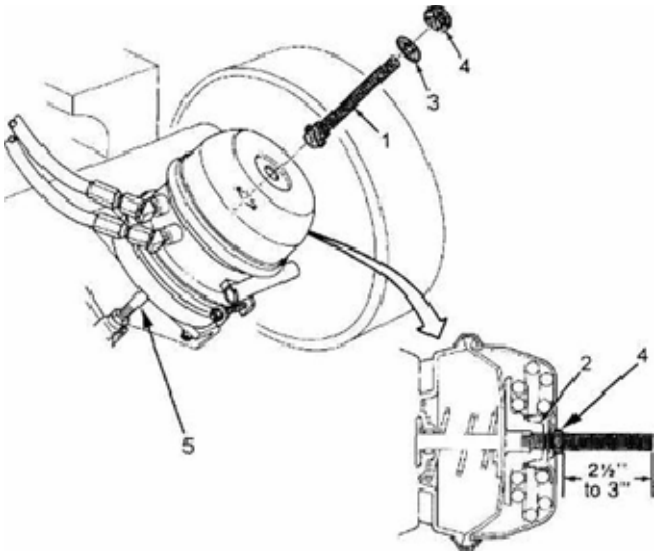


Figure 2-21. Brake Caging

(5) Insert the T-end of the caging bolt (1) into the keyhole in the brake chamber (Figure 2-21). The T-end should be inserted through keyway of the metal diaphragm inside the brake chamber. Turn the caging bolt (1) one quarter turn clockwise until the caging bolt (1) contacts stop inside diaphragm (2).

(6) Pull on the caging bolt (1) to seat it properly. The caging bolt (1) is properly positioned when it cannot be removed by pulling straight out.

(7) Place washer (3) and nut (4) onto threaded end of caging bolt (1).

(8) To cage the main spring, tighten the nut (4) on the caging bolt (1). Visually check to ensure that the service push rod (5) is retracting into the spring brake chamber. This procedure will compress the brake spring inside the brake chamber and release the brake at that wheel position.

(9) Do not over torque the caging bolt assembly (35 ft-lbs maximum).

(10) When the spring is fully compressed and the brakes are released, the threaded portion of the caging bolt (1) should extend 2.5 to 3 inches beyond the nut (4).

(11) Brakes should remain caged until proper maintenance personnel can inspect the brake system.

(12) Repeat procedures as necessary for remaining wheels.

i. Uncaging the Brakes.

(1) Loosen the nut (4) on the caging bolt (1) until brake spring is released. Remove nut and washer.

(2) Remove caging bolt by turning the caging bolt one quarter turn counterclockwise and then pulling it straight out.

(3) Insert caging bolt into sleeve on side of spring brake chamber and install the washer and nut to secure the bolt.

(4) Replace the dust cover on the caging bolt keyhole in the spring brake chamber.

2-6. COUPLING

a. General.

(1) Coupling operations may be performed with a loaded or unloaded trailer with the landing legs down.

b. Procedures.

WARNING

ALL PERSONS NOT INVOLVED IN THE COUPLING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY.

NEVER STAND BETWEEN THE PRIME MOVER AND TRAILER WHEN THE PRIME MOVER IS BEING BACKED UP TO THE TRAILER. SERIOUS INJURY OR DEATH MAY RESULT.

CAUTION

To prevent damage to equipment, two people should be utilized when coupling; the first person in the prime mover cab and the second acting as a ground guide.

(1) Review and perform prime mover towing operating procedures to prepare prime mover for coupling.

(2) Ensure that the trailer ramps are in the raised and secured position.

(3) Ensure that the stabilizer legs are disconnected and stored. If the stabilizer legs are installed remove and store them:

(a) Lower the front landing legs to relieve pressure off the rear stabilizer legs.

(b) Remove and store the rear stabilizer legs under the trailer beavertail.

(4) Using a ground guide, align prime mover with trailer.

(5) Raise the forward landing legs high enough so that the trailer lunette is slightly above the pintle of the prime mover.

(6) Slowly back the prime mover until the pintle is positioned below the lunette. With the supply (red/emergency) line disconnected from the trailer and the wheels not caged, the trailer brakes will be locked.

(7) Lower the lunette onto the pintle.

(8) Lock down pintle hook and install pintle lock pin in accordance with prime mover instructions.

(9) Raise landing legs to the transport position.

(a) Remove jack handle retaining pin.

(b) Rotate jack handle to crank position.

(c) Engage slide lock of jack handle. Pushing the crank in while turning will raise/lower the trailer quickly but with less power. Pulling the crank out is used with full payloads and will raise/lower the trailer slowly but with more power.

(d) Turn crank counterclockwise to raise the landing legs.

(e) Disengage slide lock, rotate handle to transport position.

(f) Install the jack handle retaining pin.

WARNING

WALK AROUND THE TRAILER WHEN RAISING THE DROP LEG SECTIONS OF THE LANDING LEGS INSTEAD OF CLIMBING OVER OR CRAWLING UNDER THE TRAILER.

(10) Raise each drop leg section individually to the max up position by pulling spring loaded pin and raising the bottom section of the landing leg. Ensure spring loaded pin is reengaged.

(11) Attach safety chains from trailer to prime mover by crossing chain under lunette to opposite side of eyebolt.

NOTE

When the Inter-Vehicular Electrical Cable (IVEC) is connected and the prime mover is started, the ABS warning indicator will light for 3.5 seconds and extinguish. If the indicator remains lit, see the Brake Troubleshooting section in Table 2-2.

(12) Disconnect dummy gladhands, lock together, and stow in the drawbar toolbox.

(13) Connect trailer service and emergency air hose gladhands to prime mover gladhands.

(14) Connect the IVEC to the prime mover.

(15) Check gladhands for an airtight seal.

(16) Ensure the locking tab on the prime mover is engaged into the recess of the IVEC plug.

WARNING

TRAILER AND PRIME MOVER MAY ROLL WHEN BRAKE IS RELEASED. TO PREVENT INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT, THE DRIVER MUST REMAIN IN THE CAB OF THE PRIME MOVER.

(17) Charge trailer air supply.

NOTE

The trailer is equipped with a priority valve that provides air to the reservoir first. The spring brakes will remain set until air pressure reaches 80-82 psi. At this pressure, the priority valve will allow air to begin flowing to release the spring brakes.

(18) Allow air reservoir to fill. Check operation of brakes.

(19) With the help of an assistant, check the lights.

(a) Turn on the prime mover lights.

(b) Check to make sure that all trailer clearance lights work

(c) Check to make sure that the left and right turn indicators work.

(d) Check to make sure that trailer brake lights work.

(e) Check the blackout lights.

(20) Remove the trailer wheel chocks and stow in the forward drawbar toolbox.

(21) Trailer is ready for travel.

2-7. UNCOUPLING

a. General.

(1) When uncoupling the trailer from the prime mover, the trailer can be empty (no payload) or loaded.

(2) The landing legs (Figure 2-22) under normal conditions are designed to support the trailer with a payload.

CAUTION

Sand shoes on landing legs may need additional ground pad in soft soil conditions to keep the shoes from sinking.

b. Procedures.

WARNING

ALL PERSONS NOT INVOLVED IN UNCOUPLING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY.

CAUTION

To prevent damage to equipment, two people should do uncoupling, the first person in the prime mover cab and the second acting as a ground guide.

(1) Set prime mover parking brake and trailer brake.

(2) Set the trailer wheel chock.

(3) Disconnect gladhands and connect the dummy gladhands. When the supply (red/emergency) line is disconnected from the trailer, the trailer spring brakes will set and lock.

(4) Disconnect the Inter-Vehicular Electrical Cable (IVEC).

(5) Lower each drop leg section of the landing legs individually to the maximum down position by pulling spring loaded pin and carefully lowering the bottom section of the landing leg. Do not let the lower portion of the leg drop to the ground. Ensure that the spring loaded pin is reengaged.

(6) Lower the trailer landing legs:

(a) Remove jack handle retaining pin.

(b) Rotate jack handle to crank position.

(c) Engage slide lock of jack handle. Pushing the crank in while turning will raise/lower the trailer quickly but with less power. Pulling the crank out is used with full payloads and will raise/lower the trailer slowly but with more power.

(d) Turn crank clockwise to lower the landing legs.

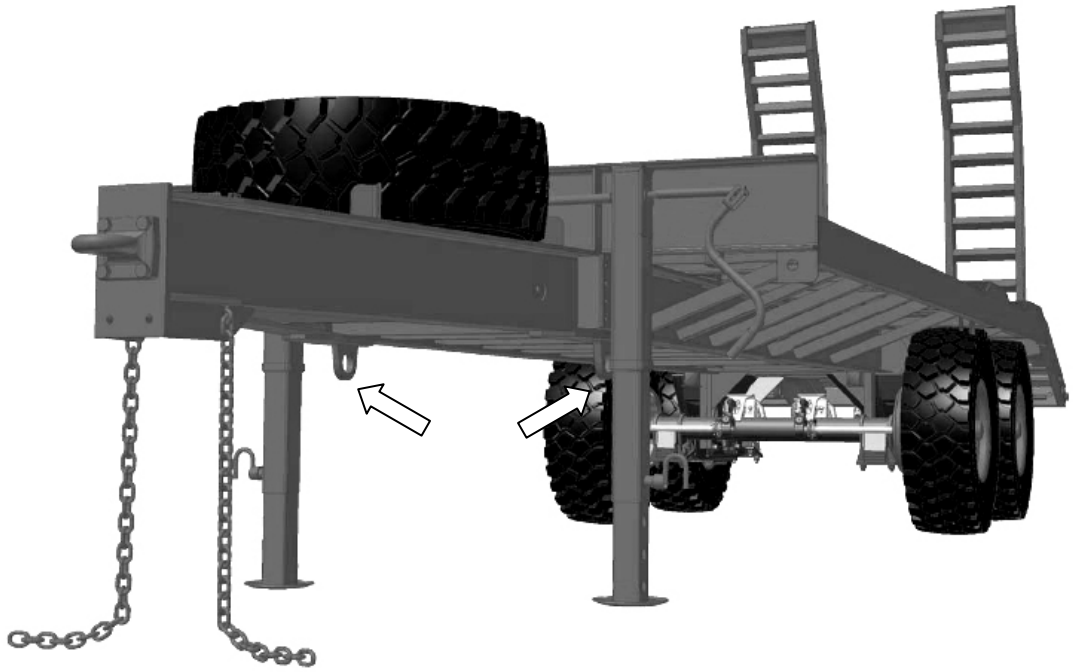


Figure 2-22. Deploying Landing Legs

(7) Unlock the pintle hook.

(8) Raise the trailer above the lunette.

(9) Unhook the safety chain hook from the prime mover and store them by hooking them onto the drawbar.

(10) Release the prime mover parking brake and slowly drive the prime mover forward.

(11) Raise or lower the trailer with the landing legs until the trailer bed is level with the ground.

2-8. LOADING PROCEDURE CONSIDERATIONS

a. General.

(1) Vehicle handling limits are affected by weight, placement, and weight distribution of a load.

(2) Do not overload the trailer. Use extreme caution when maneuvering with an oversized load. The MTVR has been cleared for towing the EET.

WARNING

WHEN TOWING THE EET WITH THE MTVR, THE MTVR LOAD WILL BE FORWARD BIASED (I.E., LOADED AS FAR FORWARD AS POSSIBLE) AND THE EET LOAD WILL BE REARWARD BIASED (I.E. LOAD AS FAR BACK AS SAFELY POSSIBLE). THIS CONFIGURATION ENCOURAGES SAFE WEIGHT DISTRIBUTION BETWEEN THE TRUCK AND TRAILER.

b. Types of Loads.

WARNING

IMPROPER LOAD PLACEMENT CAN HAVE A DETRIMENTAL EFFECT ON BRAKING, EVASIVE MANEUVERS, AND HANDLING CHARACTERISTICS OF A TRACTOR TRAILER VEHICLE COMBINATION, WHICH COULD RESULT IN INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

OPERATORS WILL USE GROUND GUIDES FOR ALL LOADING AND UNLOADING, ESPECIALLY AT NIGHT.

(1) The primary purpose of the EET is to move/transport the BHL, the LRTF or ammunition loads. However, the EET may also carry general cargo loads at the discretion of the unit commander as long as the load does not exceed the trailer load weight limitations.

(2) Concentrated Loads. A load that is localized over a short distance is a concentrated load. Trailer frame members are subject to damage or yielding when subjected to concentrated loads beyond their capacity. Generally, avoid knife edged interfaces between the load and the trailer. Load spreading devices such as timbers or steel beams are recommended when this type of interface exists.

(3) Distributed Loads. A load that bears continuously along its length of engagement with the trailer is a distributed load.

(4) Self-Supporting Loads. A load that has its own rigid base is considered to be a self-supported load. It may also be referred to as a "rigid load" or "rigid base load."

(5) Compound Loads. A load that is a combination of two or more types of loads (i.e., concentrated and distributed) on one trailer is considered to be a compound load.

(6) Eccentric Loads. A load that has its center of gravity (CG) positioned off to one side is an eccentric load. The degree of offset is a critical factor to the stability of the trailer. Problems encountered may vary from leaning of the trailer, to severe leaning, instability, and/or damage or yielding of the trailer frame.

(7) High CG Loads. A load with a high CG as in 2-20 (6) poses additional stability concerns. Reduce speed with this type of load.

(8) Divisible Loads. A load which has components that can be physically separated (such as two pieces of equipment or vehicles) is considered a divisible load.

c. Load Distribution.

(1) General. Load distribution is important in the safe use of a trailer. It is more critical as the maximum load of the trailer is approached. However, even a load that is significantly less than the overall limit of the trailer can cause an overload situation if not distributed properly.

(2) Vehicles and Equipment. The CG of the vehicles or equipment being loaded should be positioned as close as possible to the CG of the trailer for the best weight distribution.

(3) Cargo. Provisions have been made for loading a QUAD-CON container.

(4) When loading a QUAD-CON, ensure that the load on the lunette does not exceed the maximum load of 4,000 lbs.

(5) Capabilities. The following information is provided for the purpose of calculating weight distribution and to ensure that the trailer and prime mover are not overloaded.

(a) The EET is rated to carry 20,000 lbs. (10 tons).

(b) The rear axle group is capable of supporting a maximum weight of 27,000 lbs. total (trailer weight and payload).

d. Calculating CG.

(1) Generally, military vehicles and equipment have data plates that provide embarkation or loading information including the location of the center of gravity. When the CG of the payload is known, the portion of the load that is bearing on the lunette and the portion that is bearing on the axles can be determined.

(2) To determine if the trailer and prime mover combination is within its load bearing capability, this data should be compared to the trailer and prime mover limitations listed in the appropriate manuals and found on the embarkation/load data plates.

(3) Use the data and formulas provided in Figure 2-23 to determine if the trailer is loaded properly and within its limits. Known information for the trailer is provided. Information for the payload will need to be calculated through measurements and from data contained on the payload, vehicle, or equipment.

CG = Center of Gravity

CL = Center Line

EWF = Trailer Empty Weight at Front

EWR = Trailer Empty Weight at Rear

WB = Wheelbase

X = Distance from centerline of lunette to payload center of gravity

Y = Distance from payload center of gravity to center of tandem

$$\frac{(X) \times \text{Payload Weight}}{WB} + EWR = \text{Axle Load}$$

$$\frac{(Y) \times \text{Payload Weight}}{WB} + EWF = \text{Lunette Load}$$

EET Data

WB = 267.5 inches

EWF = 1637 lbs.

EWR =9398 lbs.

Figure 2-23. Calculating Trailer Center of Gravity with Payload

2-9. LOADING/UNLOADING EQUIPMENT AND CARGO

WARNING

NORMAL PROCEDURES ARE TO LOAD/OFFLOAD EQUIPMENT OVER THE RAMPS WITH THE TRAILER COUPLED TO THE PRIME MOVER. USE EXTREME CAUTION IN CASES WHERE THE TRAILER'S STABILIZER LEGS ARE USED WHEN UNCOUPLED TO PREVENT EQUIPMENT DAMAGE AND/OR PERSONAL INJURY.

CAUTION

When loading or unloading equipment, ensure that the edges of the loading ramps are on even, level ground that allows full ground contact along the edges of the ramps. Failure to have full ground contact across the edges of the ramps will cause damage to the trailer.

a. Lowering Ramp Procedures.

(1) Set prime mover parking brake and the trailer brake.

(2) Remove ramp restraining chain and binder assembly.

(3) Loosen binder chain ratchet.

(4) Remove hook end of ramp ratchet binder from ramp chain.

(5) Allow load binder and chain assembly to hang freely below trailer. Ensure chain is not crossed over decking.

(6) Ensure ramps are positioned correctly for the width of the wheel base of the equipment being loaded.

WARNING

ENSURE THAT ALL PERSONNEL ARE CLEAR BEFORE RAISING OR LOWERING REAR LOADING RAMPS. RAMPS ARE HEAVY AND MAY CAUSE SERIOUS INJURY TO PERSONNEL.

(7) Standing forward of ramp, push the ramp to lower to the ground. An alternate method is to lower the ramps to the ground by hand but ensure to stand to the side of the ramps. Do not stand under the ramp while lowering or raising the ramps.

CAUTION

Maximum load capacity of rear loading ramps is 20,000 lbs. Exceeding the maximum load capacity will cause damage to the trailer and equipment being loaded. Tracked vehicles will not be loaded across the rear ramps.

WARNING

ALL PERSONS NOT INVOLVED IN THE LOADING/UNLOADING OPERATION MUST STAND CLEAR OF PRIME MOVER AND TRAILER TO PREVENT SERIOUS INJURY.

(8) Remove the loading chains and ratchet binders from the beavertail tool box. This must be done before loading the BHL since the load will cover the tool box.

b. Load Equipment.

WARNING

DUE TO THE DIMENSIONS AND CENTER OF GRAVITY OF SOME LOADS, PROPER PROCEDURES MUST BE FOLLOWED WHEN LOADING AND UNLOADING EQUIPMENT TO PREVENT DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL.

WARNING

ALWAYS USE A GROUND GUIDE WHEN LOADING OR UNLOADING THE TRAILER. IF THE TRAILER IS NOT CONNECTED TO THE PRIME MOVER ENSURE THAT THE REAR STABILIZER LEGS ARE DOWN AND LOCKED.

CAUTION

Do not conduct operations with equipment that is too wide to be properly transported on the trailer.

(1) Align equipment to be loaded with the trailer so that the equipment can be driven straight onto the trailer. Turning vehicles while on the trailer can present hazardous conditions and/or damage the trailer.

(2) If equipment is not aligned properly during loading, stop the loading procedure, back the equipment off the trailer, align it properly, and begin loading procedure again.

CAUTION

When securing cargo or equipment, use only the tie down points provided for that purpose.

(3) Secure payload in accordance with instructions in paragraph 2-11b.

c. Offload Equipment.

(1) If the trailer is uncoupled from the prime mover:

(a) Remove the rear stabilizer legs and install under the trailer beavertail.

(b) Remove the pin from the drop leg portion of the stabilizer legs and lower the drop leg portion to the ground. Install the pin back in the drop leg in the hole that will allow the leg to reach as close to the ground as possible.

(c) Go to the front of the trailer and crank the landing legs down until the rear stabilizing legs are firmly on the ground.

(2) Remove tie downs from equipment.

(3) Slowly drive the equipment straight off the trailer down the rear ramps. Turning the equipment on the trailer may create a hazardous condition, or in the case of tracked vehicles, cause undue damage to the trailer.

WARNING

OPERATORS WILL USE GROUND GUIDES FOR ALL LOADING AND UNLOADING, ESPECIALLY AT NIGHT. ENSURE THAT TWO GROUND GUIDES ARE USED WHEN LOADING AND UNLOADING THE BHL DUE TO THE WIDTH OF TIRES.

IF THE TRAILER IS NOT CONNECTED TO THE PRIME MOVER ENSURE THAT THE REAR STABILIZER LEGS ARE DOWN AND LOCKED.

(4) Return the ramps to the upright position and reinstall the ramp restraint chains and binder assembly.

(5) Store tie downs in beavertail toolbox

d. Raise Rear Loading Ramps.

(1) Standing behind ramp with both hands below ramp using proper lift procedures, lift ramp chest high.

(2) Switch hands below ramp and walk ramp to upright position.

(3) Return ramps to a position where outer edge is flush with the outer edge of the trailer bed, as seen in Figure 2-24.

(4) Attach load binder to ramp chain.

CAUTION

Over tightening the load binder could cause damage to the ramp rod.

(5) Engage ratchet and tighten to take slack out of chain and apply minimal tension.

(6) Disengage ratchet and rotate load binder handle to face the back of the trailer.

(7) Attach load binding securing chain to the handle.

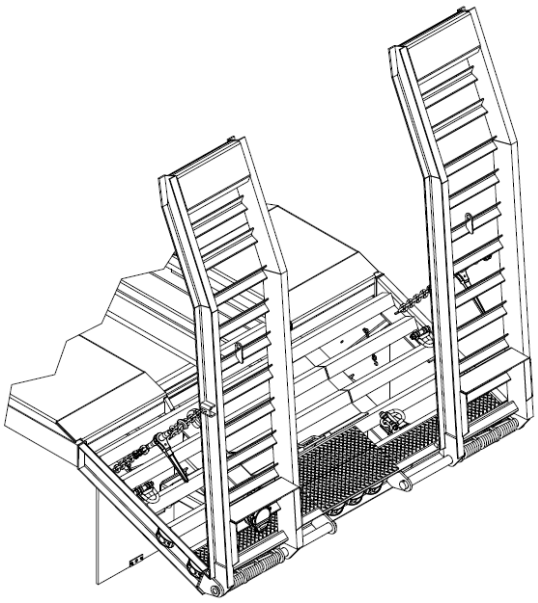


Figure 2-24. Ramp Stowage Position

e. Container Procedures.

(1) The EET can be configured to carry one QUAD-CON container.

WARNING

MOVEMENT (SLOSHING) OF LIQUID IN QUAD-CON DECREASES THE TRAILER STABILITY DURING TURNING AND OPERATIONS ON UNEVEN TERRAIN. FAILURE TO USE EXTREME CAUTION MAY RESULT IN OVERTURNING OF TRAILER CAUSING SEVERE INJURY OR DEATH TO PERSONNEL.

(2) Clean dirt, sand, or other debris from the QUAD-CON container twist locks on trailer.

WARNING

DO NOT STAND UNDER QUAD-CON CONTAINER DURING LOADING/OFFLOADING OPERATION. SERIOUS INJURY OR DEATH MAY RESULT.

f. Container Loading Procedures.

(1) From under trailer deck, push up handle and rotate International Organization for Standardization (ISO) twist lock 90 degrees from the stowed to the receive position for all four twist locks, see Figure 2-25.

(2) Lower QUAD-CON onto all four ISO twist locks.

WARNING

USE EXTREME CAUTION WHEN ALIGNING AND LOWERING THE QUAD-CON CONTAINER ONTO ISO TWIST LOCKS. HANDS AND FINGERS SHOULD BE KEPT CLEAR TO AVOID INJURY. PUSH ON ISO CONTAINER KEEPING HANDS AWAY FROM ISO LOCKDOWN POINTS, TO GUIDE CONTAINER ONTO LOCKS.

(3) Walk around rear of trailer and ensure QUAD-CON is flush on trailer.

(4) Lock container for transport by rotating all four ISO twist locks another 90 degrees into the locked position. Visually ensure that the head of the ISO twist locks are in the locked position.

(5) Trailer is ready for travel.

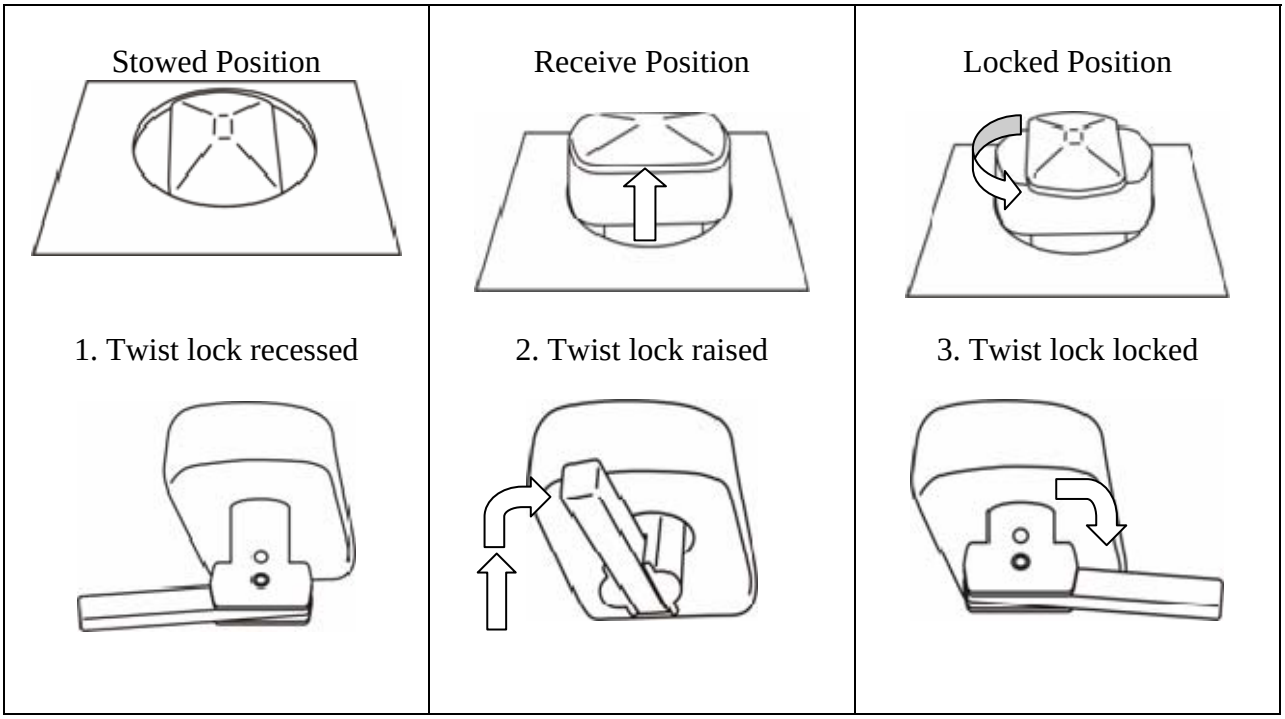


Figure 2-25. Twist Locks Positions

g. Container Offloading Procedures.

(1) Rotate all four ISO twist locks 90 degrees. Visually ensure the ISO twist locks are in the unlocked position.

(2) Raise and remove the QUAD-CON.

(3) Rotate the four ISO twist locks another 90 degrees to the recessed position so trailer deck is clear of obstructions.

2-10. PAYLOAD CONFIGURATIONS

a. Permit/License Requirements.

(1) The license is on the prime mover.

(2) Once a driver is licensed on the prime mover, they are qualified to tow anything that is authorized to be towed behind the prime mover.

(3) Ensure to check with the local Continental United States (CONUS) and Outside the Continental United States (OCONUS) laws and regulations to determine if special permits are required or if restrictions exits.

b. Payload Information.

(1) Table 2-1 provides information on common equipment and vehicle payloads that will be transported on this trailer using the MTVR family of vehicles as the prime mover. This information is provided as a guide and should be used to determine whether or not a permit is required for use on public roads. Payload configurations not covered in this table may require a permit. Check local regulations for permit requirements.

(2) Check height of payload/trailer combination. Payloads exceeding 13'-6" may require permits and special routing.

Table 2-1. Common Equipment and Payload

PAYLOAD	PAYLOAD WEIGHT (lbs)	GROSS VEHICLE WEIGHT (gvw)	BRIDGE FORMULA
BHL	19,000 lbs	30,035 lbs	OK
LRTF	13,450 lbs	24,485 lbs	OK

2-11. TIE DOWN PROCEDURES

a. Preparing Payload for Loading.

(1) The EET is designed to transport cargo and equipment.

(2) Loads must always be secured, even for trips of a short distance. Check cargo tie downs approximately two miles from the departure point, at all halts, and whenever a problem with the load is suspected. Vibration may reveal a problem with loads that appeared secure at the time of departure. Secure rotating parts, to prevent rotation into the path of oncoming traffic.

(3) The payload should be as symmetrical as possible about the longitudinal centerline of the trailer. Distribute the payload as uniformly as possible over the cargo trailer bed. Improperly placed cargo can make vehicles unstable and difficult to control. Never overload a trailer. The trailer data plate provides the rated payload capacity.

(4) When loaded, shut down payload equipment, turn off all switches, close doors, and hatches.

(5) Set brakes and place transmission in "Park" on payload equipment.

b. Securing Payload.

(1) Select tie down point on trailer that allows chain to be at 45 degree angle fore and aft.

(2) Be sure to use the correct attachment points on the equipment and trailer. Do not use bumpers, axles, towing pintle, or towing lunette hooks as points of attachment for chains.

(3) Tighten chains using the ratchet load binders.

(4) Secure excess chain to the tension-bearing part of the chain.

(5) Make sure ramps are raised and properly secured.

(6) Make sure all SL-3 items are properly stowed on the trailer.

(7) Check all cargo tie downs at first opportunity after departure. Recheck all cargo tie downs at halts.

c. Securing a Backhoe Loader (BHL).

(1) Load the BHL in accordance with paragraph 2-9. Take out five chains and five binder ratchets before loading the BHL since the beavertail tool box cannot be opened once the BHL is on the trailer.

(2) Ensure that the BHL is positioned so that the large rear wheels of the BHL are centered between the raised trailer wheel wells and the BHL is centered on the trailer (left and right), Figure 2-26.

(3) Lower the BHL front bucket so that the bucket rests flat on the trailer's deck.

(4) Lower the rear BHL arm so that the bottom of the bucket rests on the resting plate located on the rear center of the trailer beavertail. The BHL arm should be raised as high as possible without exceeding the height of the top of the BHL cab.

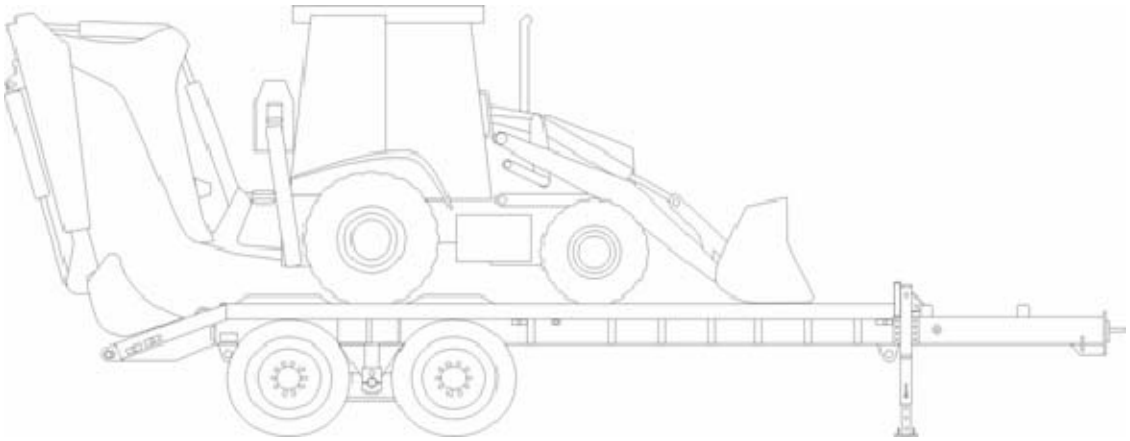


Figure 2-26. Correct position of the BHL.

(5) Chain down the BHL using five chains and five binder ratchets:

(a) Secure the BHL bucket and arm by securing one end of a load chain to the beavertail tie down point, pass the free end of the chain over the bucket and secure the other end to the other beavertail tie down point. Put the chain's slack into the bucket and attach the binder ratchet to the chain where they run over the edge of the bucket (Figure 2-27).

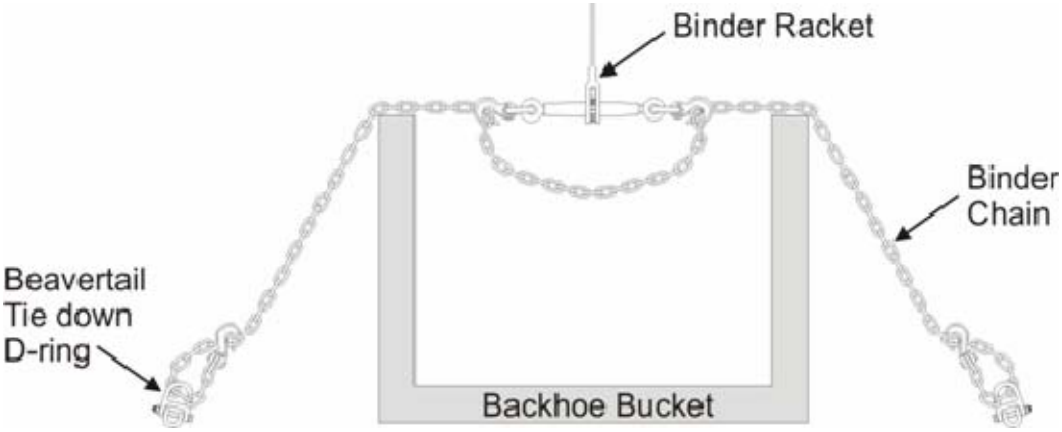


Figure 2-27. Chain routing for the BHL bucket.

(b) Secure the BHL chassis by running a tie down chain through the cargo tie down D-ring located on the outside edge of the beavertail on the driver's side of the trailer. Then pass the other end through the tie down point located just below where the BHL arm is attached to the BHL chassis on the passenger's side. This will ensure that the chains are crossed once they are tightened and provide lateral support. Connect one end of a binder ratchet to the chain coming from the trailer and the other end of the ratchet to the free end of the chain (Figure 2-28). Remove as much slack in the chain as possible to ensure that the ratchet will have enough range to pull the chain tight. After the binder ratchet is tightened, wrap the excess chain and hook the free end on to the taught chain (Figure 2-29). Repeat this process on the other side so that two

sets of chains and binders cross just below the BHL and angle out and down at approximately 45°.

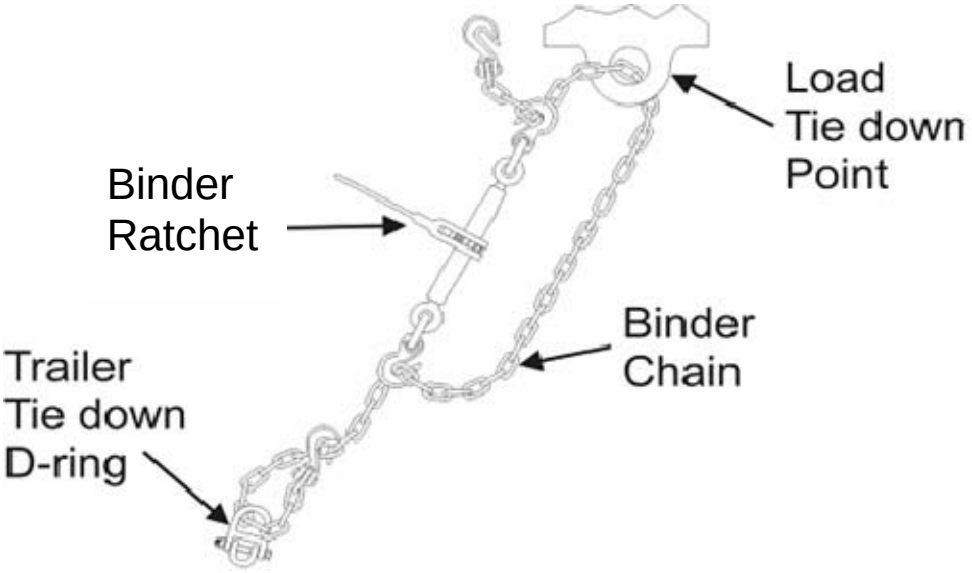


Figure 2-28. Chain Routing for tying down loaded vehicle.

Figure 2-29. Rear of BHL chassis properly tied and tie down chains secured.

(c) Secure the front of the BHL by repeating the steps in (5)(b). The chains will attach to the trailer just forward of the BHL front tires so that they angle about 45° to the BHL tie down point. Cross the chain from the driver's side cargo tie down point over to the tie down point on the passenger's (right) side of the BHL. Repeat this process for the other side of the BHL so that the chains cross just in front of the BHL and the angle out from the BHL at a 45° angle (Figure 2-30).

Figure 2-30. Front of BHL chassis properly tied down.

d. Securing a Light-Capability Rough Terrain Forklift (LRTF).

(1) Load the forklift in accordance with paragraph 2-9.

(2) Ensure that the forklift is positioned so the rear wheels of the LRTF are centered between the trailer's raised wheel wells and the LRTF is centered on the trailer centerline (left and right) (Figure 2-31).

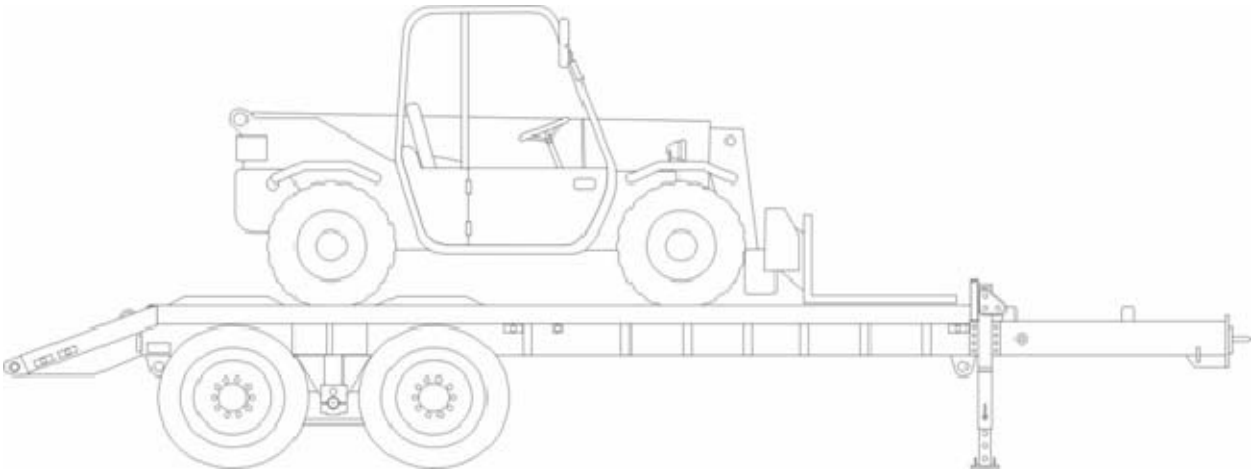


Figure 2-31. Correct position of the LRTF.

(3) Lower the forks so that they rest flat on the trailer's deck.

(4) Chain down the LRTF using four chains and four binder ratchets:

(a) Secure the back of the LRTF chassis by running a tie down chain through the cargo tie down D-ring on the outside edge of the beavertail on the driver's side of the trailer. Pass the other end of the chain up through the tie down point on the passenger's side of the vehicle. This will ensure that the chains are crossed once they are tightened and will provide

lateral support. Connect one end of a binder ratchet to the chain coming from the trailer and the other end of the ratchet to the free end of the chain (Figure 2-28). Remove as much slack in the chain as possible to ensure that the ratchet will have enough range to pull the chain tight. Repeat this process on the other side so that two sets of chains and binders cross just below the LRTF and angle out and down at approximately 45° (Figure 2-32).

Figure 2-32. Rear of LRTF chassis properly tied.

(b) Secure the front of the LRTF by attaching a tie down chain to the trailer cargo tie down point on the side and about center of the LRTF forks (Figure 2-33). The tie down chains on the front of the LRTF will not cross, but will angle up to the forklift tie down points on the same side of the vehicle. Repeat this process for the other side of the LRTF. The chains run straight back to the LRTF and down at a 45° angle (Figure 2-33).

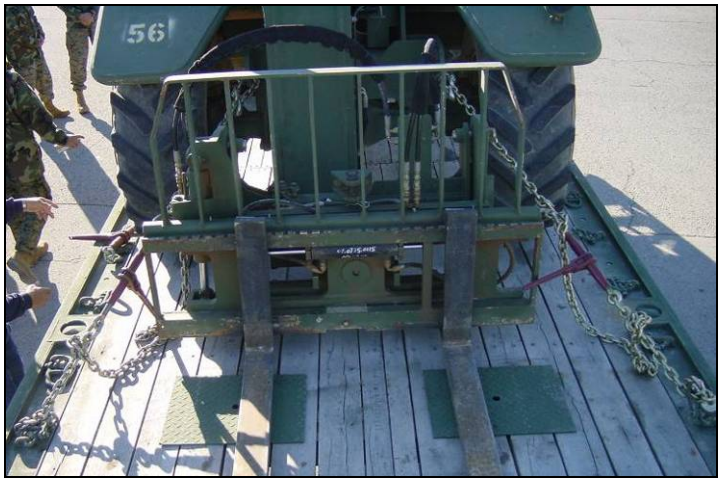


Figure 2-33. Rear of LRTF chassis properly tied.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-12. OPERATION IN EXTREME COLD

a. Operation.

(1) Use caution when placing the trailer in motion after a shutdown. Congealed lubricants can cause parts failure.

(2) Check tires. They may be frozen to the ground or have flat spots if they were under inflated.

(3) Check brakes. Brake shoes may be frozen to the brake drums.

WARNING

SOME COMPONENTS OF THE BRAKE SYSTEM ARE NOT RATED TO OPERATE CORRECTLY AT TEMPERATURES THAT ARE BELOW -40°F. DO NOT OPERATE THE EET IN TEMPERATURES THAT ARE COLDER THAN -40°F.

b. During Operation Stops.

(1) For short shutdown periods, park in a sheltered spot out of the wind.

(2) For long shutdown periods, if high dry ground is not available, prepare a footing of planks or brush.

(3) Remove all buildup of ice and snow as soon as possible after shutdown.

(4) Cover and shield the trailer with canvas covers if available. Keep ends of covers off ground to keep them from freezing to the ground.

2-13. OPERATION IN EXTREME HEAT

Do not park the trailer in the sun for long periods of time as heat and sunlight will shorten the life of the tires. Park the trailer where it will get maximum protection from heat, sun, and dust.

2-14. OPERATION IN RAINY OR HUMID CONDITIONS

Frequently clean, inspect, and lubricate inactive equipment to prevent rust and fungus accumulation.

2-15. OPERATION IN SALT WATER AREAS

Salt water will cause metal parts to rust and corrode. Clean, inspect, and lubricate frequently.

2-16. OPERATION IN MUD OR SAND

a. General Operation.

CAUTION

Do not tow, pull, or push trailer by the rear bumper. Damage to trailer may result.

(1) Operation on unimproved roads containing mud or soft sand surfaces requires extra caution to prevent damage to the trailer. The trailer may be difficult to move through soft sand or mud, particularly with a payload onboard. If sand or mud builds up in front of or behind the wheels, rock the trailer back and forth or use a shovel to clear the build up.

(2) If the prime mover is unable to move the trailer, offloading the cargo may be necessary. Drive the trailer to firmer ground before loading the cargo again and continuing the mission.

b. Ramps.

(1) Sand will accumulate in the ramps when conducting loading and unloading operations in sandy terrain. Use caution when raising ramps to prevent getting sand in eyes.

WARNING

SAND AND LOOSE DIRT MAY CATCH IN RAMPS AND BECOME AIRBORNE WHEN RAMPS ARE RAISED. USE CAUTION WHEN RAISING RAMPS TO AVOID GETTING SAND OR DIRT IN EYES.

(2) When raising ramps in sandy terrain, conduct the following procedures:

(a) Raise ramp off ground.

(b) Shake ramp to cause loose sand to fall out.

(c) Carefully raise ramp to full, upright position and secure.

c. Cleaning.

(1) Frequently clean, inspect, and lubricate the trailer when operating in sand or mud.

(2) Clean debris from wheels.

(3) Flush brake drums with high pressure water spray. Sand or mud build up in brake drums can decrease braking ability and/or create an out of balance wheel.

2-17. OPERATION ON ROCKY TERRAIN

a. General Operation.

(1) Operation on unimproved roads containing rough, uneven surfaces or large rocks require extra caution to prevent damage to the trailer.

(2) Before driving over large rocks or severely rutted areas in roads, make sure the trailer can clear them. Such obstacles can damage components on the underside of the trailer. Beware of low hanging limbs that can damage cargo.

(3) Be sure a serviceable spare tire and rim assembly is available since there is a greater chance of tire puncture on unimproved roads containing rough, uneven surfaces or large rocks.

b. Load/Unload.

(1) Attempt to find level ground for loading or unloading operations.

(2) Damage to trailer can occur if ramps are lowered on uneven ground.

2-18. FORDING OPERATIONS

a. Before Fording.

(1) Check bottom surface conditions. If bottom is too soft, do not ford.

b. After Fording.

(1) Apply brakes a few times to help dry out brake linings after leaving the water. Make sure trailer brakes are working before driving at normal speeds.

(2) Drain or dry all areas where water has collected.

(3) At the first opportunity after fording, the following procedures should be followed:

(a) Lubricate all unpainted surfaces.

(b) After submersion, wheel bearings should be cleaned and repacked with grease as specified on the lubrication chart. Notify maintenance.

(c) Dry all lubrication points and lubricate as specified on the lubrication chart.

2-19. SLING LIFTING OPERATIONS

a. Preparation.

(1) Secure any loose items in storage bins.

(2) Attach equal length sling to four lift lugs (Figure 2-34) on trailer in accordance with manufacturer's data plate (Figure 1-2).

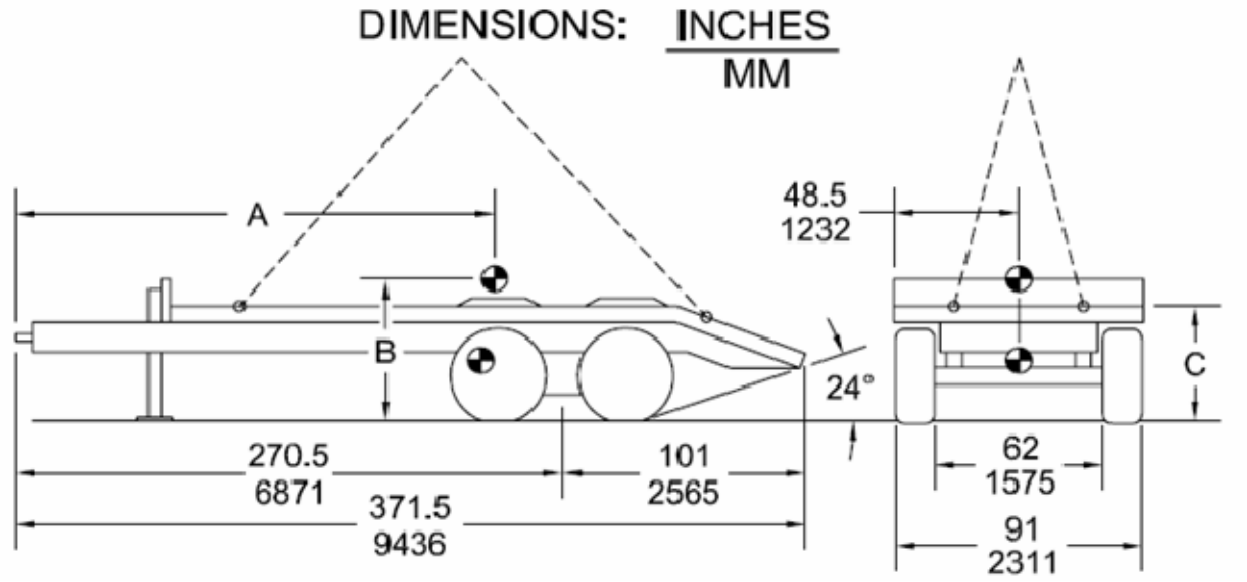


Figure 2-34. Sling Lift Points

b. Operation. Conduct sling lifting operations in accordance with local procedures.

2-20. MPS/RAIL TRANSPORT PROCEDURES

a. General. This trailer can be transported by rail or MPS with payload or cargo

b. Tie Down Procedures.

(1) If required during transportation, remove and reattach loading ramps in accordance with paragraph 3-11.

(2) Load trailer onto rail car. If trailer is to be sling lifted, see paragraph 2-19 for instructions.

(3) Block wheels to prevent trailer from rolling.

(4) Support front of trailer with landing legs. Do not use drop legs to support trailer during rail transport operations. Extend landing legs only with drop legs fully retracted.

(5) Secure trailer to rail car using front and rear tie down points (Figure 2-35) on both sides of the frame of the trailer. See Military Traffic Management Command, Transportation Engineering Agency (MTMCTEA) pamphlet number 55-19, for detailed tie down procedures.

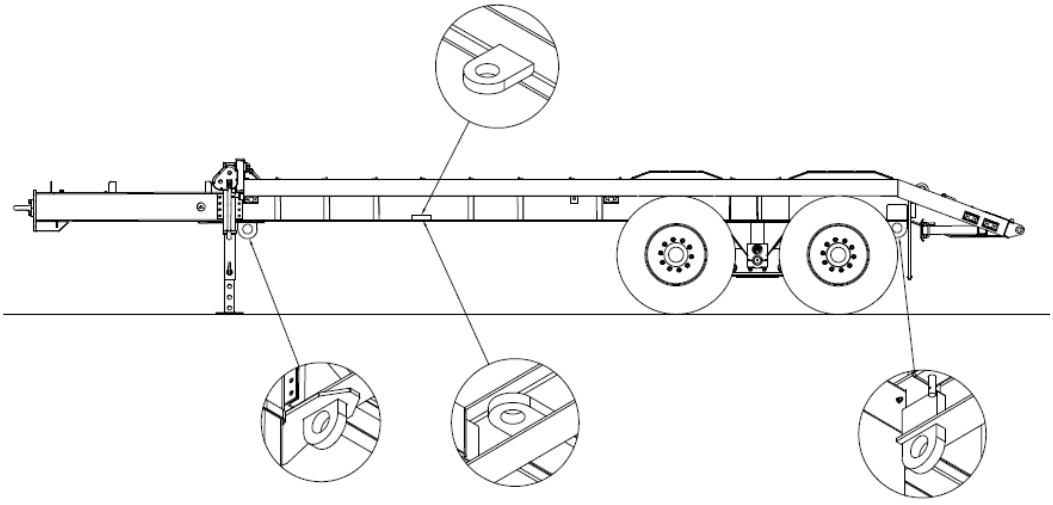


Figure 2-35. Trailer Tie Down Point

Section V. OPERATOR MAINTENANCE

2-21. ELECTRICAL CONNECTORS CHECK

a. Cleaning.

WARNING

REMOVE POWER TO THE TRAILER PRIOR TO WORKING ON THE ELECTRICAL SYSTEM. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

(1) Disconnect power supply cable from prime mover to trailer.

(2) Use a cloth to remove any build up of grease or dirt from exterior of connector.

(3) Remove protective cover from connector.

(4) Using a brush and electrical contact cleaner, clean metal surfaces.

(5) Allow time to dry before reconnecting.

b. Inspection.

(1) Inspect connector and pins for damage or corrosion.

(2) Notify maintenance if any damage is found.

2-22. GLADHANDS AND AIRLINES CHECK

a. Cleaning.

(1) Use a cloth to remove any buildup of grease and dirt from gladhands.

(2) Use a cloth, detergent and water to thoroughly clean gladhand connecting surface (1) in Figure 2.36, to include screen and rubber grommet.

(3) Allow parts to dry thoroughly.

b. Inspection.

(1) Inspect gladhands and airlines for damage.

(a) Check rubber grommet and screen for damage (1) (Figure 2-36).

(b) Use a soapy water solution to check for air leaks.

(2) Notify maintenance if damage is found.

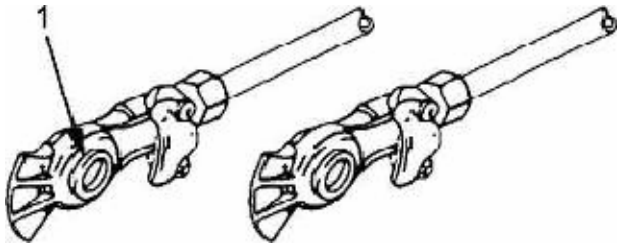


Figure 2-36. Gladhand

2-23. AIR RESERVOIR SERVICE CHECK

a. Turn off air supply to trailer.

b. Disconnect gladhands.

c. Pull lanyard on remote petcock to allow air reservoir to drain fully.

d. Connect gladhands.

e. Turn on air supply to trailer at prime mover.

f. Check for air leaks. Listen for hissing sounds and feel for air escaping. A soapy water solution will aid in detecting air leaks. Notify maintenance if leaks are detected.

2-24. TIRE CHANGING PROCEDURES

a. Spare Tire Removal.

(1) Remove safety bolt (or pad lock) from wing bolt.

(2) Unscrew wing bolt (2) counterclockwise (Figure 2-37), remove, and set out of way.

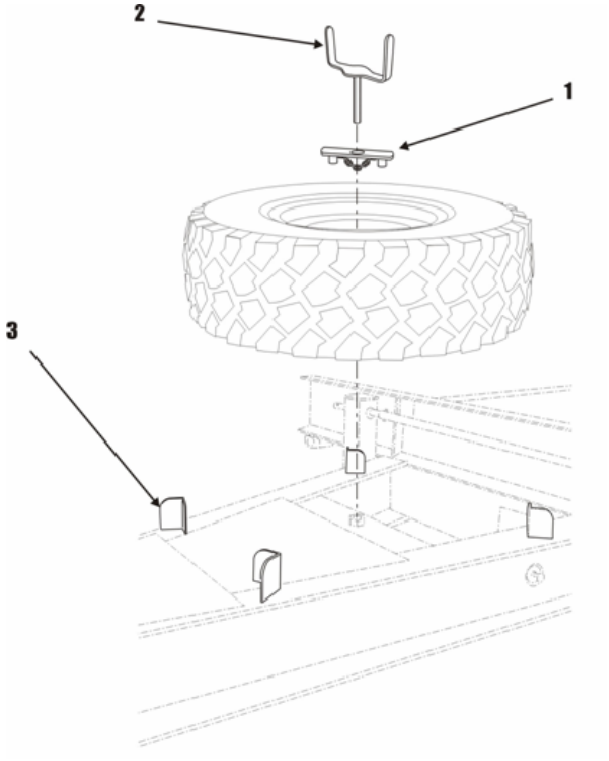


Figure 2-37. Spare Tire Wing Bolt

(3) Remove the two piece davit from the drawbar toolbox.

(4) Install lower section of davit into pipe receptacle (Figure 2-38).

(5) Insert top section of davit with the winch attached with the strap over the top of roller.

(6) Standing on the trailer deck, disengage ratchet binder on winch and rotate handle to lower strap to tire.

(7) Reengage ratchet binder on winch.

(8) Attach winch strap to hold down bar (1) underneath wheel with the chain up and the dowels indexed into the holes.

(9) Standing on the trailer, turn handle to raise tire off the trailer drawbar.

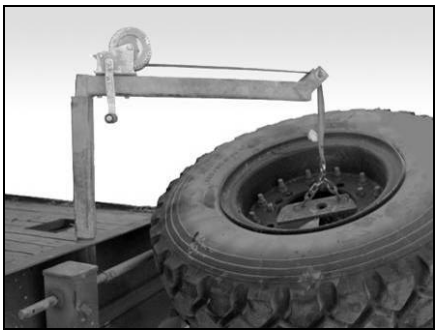


Figure 2-38. Spare Tire Hoisted using the Davit and Winch

(10) Standing on the ground, rotate tire to clear drawbar.

WARNING

DO NOT RELEASE WINCH HANDLE UNLESS RATCHET BINDER IS PROPERLY ENGAGED. DO NOT DISENGAGE RATCHET UNLESS TENSION IS APPLIED TO HANDLE. FAILURE TO OBSERVE THIS WARNING COULD CAUSE THE HANDLE TO SPIN OUT OF CONTROL AND CAUSE PERSONAL INJURY.

(11) Hold the winch handle, disengage the ratchet binder and lower tire to the ground. Lean the tire against the drawbar allow some slack to release the hold down bar.

(12) Stow davit sections in drawbar toolbox and reattach the hold down bar and wing bolt.

b. Trailer Tire Removal.

(1) Loosen lug nuts on the tire assembly that is to be removed but do not remove the lug nuts.

WARNING

RAISING THE TRAILER WITH THE LUG NUTS REMOVED COULD CAUSE PERSONAL INJURY.

NOTE

Ensure trailer is unloaded prior to performing jacking operations.

(2) Using the prime mover jack (Figure 2-39), place the jack under the suspension on the same side as the tire assembly that is to be removed.

Figure 2-39. Proper Jack Location

(3) Jack the tire off the ground approximately 6 inches to allow room for the jack stand.

WARNING

ALWAYS USE JACK STANDS OR REAR STABILIZER LEGS TO SUPPORT THE TRAILER WHEN REMOVING A TIRE AND WHEEL ASSEMBLY. SERIOUS INJURY CAN RESULT IF THE JACK FAILS AND THE TRAILER IS NOT SUPPORTED.

(4) Place jack stand under the axle frame support bracket of the trailer where the tire assembly is being removed.

(5) Remove lug nuts.

WARNING

TIRES WEIGH APPROXIMATELY 340 LBS. DO NOT STAND WHERE TIRE COULD FALL AND CAUSE PERSONAL INJURY.

(6) With the aid of an assistant, remove the tire assembly.

c. Trailer Tire Installation.

(1) With the aid of an assistant, install tire assembly.

(2) Tighten the lug nuts in accordance with the sequence shown in Figure 2-40.

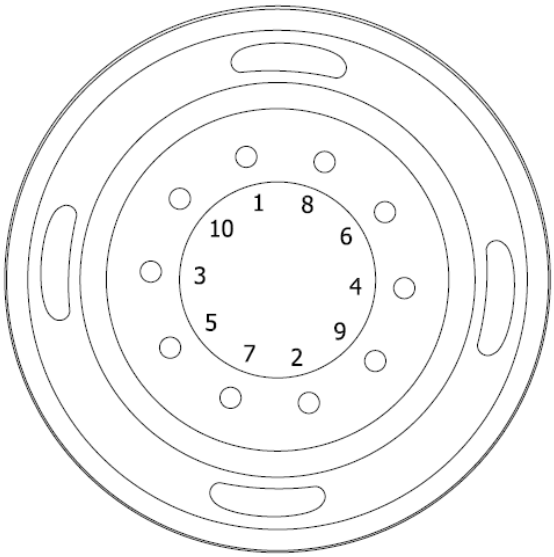


Figure 2-40. Tightening Sequence for Lug Nuts

(3) Install lug nuts and tighten to 50 ft-lbs using the sequence marked on the wheel.

(4) Torque lug nuts to 475 ft-lbs using the same sequence.

NOTE

It is recommended that a torque wrench be used. If a torque wrench is not available, tighten the lug nuts with a wrench and a bar, pushing down with full body weight. Check for proper torque at earliest availability.

(5) Check tire assembly for proper air pressure. Adjust air pressure as required.

(6) Check alignment of tire assembly. Place a block of wood or other object on the ground at the side of the tire and rotate the wheel. If the distance between the block of wood and the tire varies by more than 1/8 inch, the tire assembly is not properly mounted. To correct, loosen the nut on the side with the greatest deviation and tighten the nuts on the opposite side. Recheck the torque and the alignment.

NOTE

Lug nuts should be checked for proper torque after the first 50 to 100 miles of operation.

(7) Remove jack stand. Lower trailer and remove jack.

(8) Recheck torque of lug nuts. Notify maintenance of tire change.

d. Spare Tire Installation.

(1) Remove the two piece davit from the drawbar toolbox.

(2) Install lower section of davit into pipe receptacle.

(3) Insert top section of davit with the winch attached.

(4) Standing on the trailer deck, disengage ratchet binder on winch and rotate handle to lower strap to tire.

(5) Reengage ratchet binder on winch.

(6) Attach winch strap to hold down bar underneath wheel with the chain up and the dowels indexed into the holes.

(7) Standing on the trailer, turn handle to raise tire above the trailer drawbar.

(8) Standing on the ground, rotate tire over the top of the drawbar.

(9) Hold the winch handle, disengage the ratchet binder and lower the tire allowing some slack to release the hold down bar.

(10) Place hold down bar on the wheel with the chain down and dowels indexed into the holes.

(11) Screw wing bolt clockwise and tighten.

(12) Attach safety bolt (or pad lock) to wing bolt.

(13) Stow davit sections in drawbar toolbox.

Section VI. OPERATOR TROUBLESHOOTING

2-25. OPERATOR TROUBLESHOOTING PROCEDURES

a. General Information.

(1) Knowledge of key components and understanding of their function will facilitate quicker and more accurate troubleshooting and identification of maintenance requirements. The troubleshooting guidelines are provided as an aid in locating and correcting problems that occur during operation of the trailer. Perform the inspection procedures in the order listed for a particular item.

(2) The operator should use the troubleshooting procedures in Table 2-2 to find and apply proper corrective action. PMCS procedures are contained in Appendix D.

Table 2-2. Operator Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
ELECTRICAL SYSTEM		
All lights inoperable.	Check lights on prime mover, including turn signals and stop lights.	Notify maintenance if prime mover lights are inoperable.
One or more lights inoperable.	Check electrical connection at cable receptacle.	Reconnect cable if not properly connected.
	Check connectors for dirty, corroded, or damaged pins.	Clean in accordance with procedures in paragraph 2-21. Notify maintenance if pins are damaged.
	Check for burned out or defective LED.	Notify maintenance for replacement.
	Check for broken lead wires or loose connections.	Notify maintenance for repair.
	Check light assembly for damage.	Notify maintenance for repair.
	Check for dirty or corroded connectors at back of light.	Clean in accordance with procedures in paragraph 2-21.
BRAKES		
Brakes will not release.	Check prime mover air supply to ensure air is flowing.	Release prime mover parking brake to start air flow to trailer.
	Check pressure in prime mover air supply.	If air pressure is low, build up to required level.
	Check air line connection at the gladhands.	If air lines are not properly connected, remove and reconnect.

Table 2-2. Operator Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
	Check for dirty or damaged seals in the gladhands.	Clean in accordance with procedures in paragraph 2-22. Notify maintenance if gladhands are leaking.
	Check for open drain cock on air reservoir.	If drain cock is open, close and inspect for damage.
Brakes grab.	Inspect air line connections for leaks.	Notify maintenance if leaks are found.
	Check for moisture in air reservoir by pulling lanyard on remote petcock.	If moisture is present, allow reservoir to drain.
Brakes fail to engage.	Check control (blue/service) air line connection at gladhand.	If line is not properly connected, remove and reconnect. If no air is flowing from prime mover, notify maintenance and use another prime mover.
	Check for dirty or damaged seals in the gladhands.	Clean in accordance with procedures in paragraph 2-22. Notify maintenance if gladhands are leaking.
	Inspect control (blue/service) air line for damage.	Notify maintenance if damage is found.
	Check brake system hardware for damaged or missing components.	Notify maintenance for further inspections and/or repairs.
ABS warning light remains lit.	Check connections and cables.	Reconnect.
		Notify maintenance for repair.
SUSPENSION		
Tires making contact with wheel well.	Check suspension springs.	Notify maintenance for repair.

Table 2-2. Operator Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
TIRES		
Flat Tire	Check for tire damage.	Replace with spare tire using procedures in paragraph 2-24.
Excessively worn, scuffed or cupped tires.	Check tire pressure.	Inflate or deflate tires as required for proper pressure. Notify maintenance if tires need replaced.
	Check for loose, cracked, or broken wheels.	If wheels are loose, tighten and torque lug nuts in accordance paragraph 2-24c. Notify maintenance if wheel is cracked or broken.
	Check axle for misalignment. Axles should track behind each other and the prime mover when moving. If trailer 'crabs', or does not track straight, axles may be misaligned.	Notify maintenance if axle appears to be misaligned.

CHAPTER 3
INTERMEDIATE LEVEL OF MAINTENANCE OF FRAME AND RAMPS

Section I. INTRODUCTION

3-1. GENERAL

This chapter will address the Intermediate Level of maintenance (LOM) associated with the frame, drawbar, ramps, load bed, tie downs, and spare tire assembly of the MTO20A1 trailer (Figure 3-1).

Figure 3-1. MTO20A1 Engineer Equipment Trailer (EET)

Section II. TROUBLESHOOTING

3-2. FRAME AND LOAD BED TROUBLESHOOTING PROCEDURES

Troubleshooting guidelines are provided as an aid in locating and correcting problems that occur during operation of the trailer. Check operator troubleshooting procedures prior to performing the procedures listed in Table 3-1. Perform the inspection procedures in the order listed for a particular item.

Table 3-1. Frame and Load Bed Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
SPARE TIRE ASSEMBLY		
Retaining bolt fails to secure spare tire assembly.	Check threads on retaining bolt and nut for damage.	Repair or replace.
LOAD BED		
Boards loose.	Check for missing or loose screws.	Tighten or replace screws in accordance with paragraph 3-7.
	Check for warped or damaged boards.	Replace in accordance with paragraph 3-7.
BEAVERTAIL		
Cleats damaged or missing.	Check cleat for extent of damage.	Repair or replace.
RAMPS		
Ramp safety chain unable to be secured.	Check safety chain ramp attachment.	Replace in accordance with paragraph 3-13.
Ramps will not raise or lower properly.	Check for damage to ramps.	Repair in accordance with paragraph 3-11.
	Check for damage to hinge pin.	Repair in accordance with paragraph 3-12.
	Check for damage to hinge bracket.	Repair in accordance with paragraph 3-12.
FRAME		
Frame damaged.	Check cracked, damaged, or corroded frame.	Submit a Recoverable Item Report (WIR).

Section III. FRAME (CHASSIS) AND RAMPS

3-3. LUNETTE

a. Tools Required.

Torque Wrench
1 1/16” Wrench (nut)
1 1/8” Wrench (bolt)

b. Equipment Condition.

Trailer empty and supported by landing legs.
Brakes set (locked) and wheels chocked.

c. Removal.

(1) Remove by unbolting lunette plate (Figure 3-2).

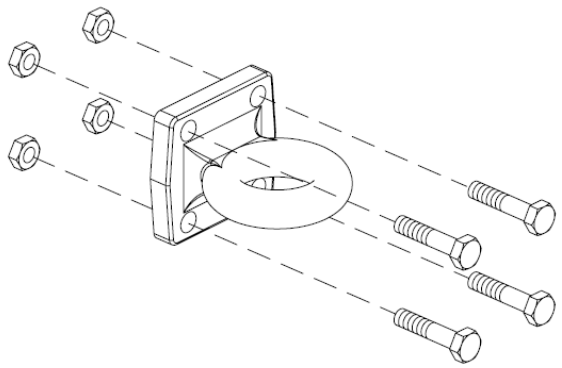


Figure 3-2. Lunette

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-2, for appropriate part information.

e. Installation.

(1) Install by bolting lunette plate to drawbar.

(2) Torque bolts to 375 lbs.

3-4. SAFETY CHAINS (BREAKAWAY CHAINS)

a. Tools Required.

Oxyacetylene cutting torch/welder
Grinder

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Trailer empty and supported by landing legs.
Brakes set (locked) and wheels chocked.

c. Removal.

NOTE

Chemical Agent Resistant Coating (CARC) paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

CAUTION

While removing the safety chain bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

(2) Remove safety chain bracket (Figure 3-3) from trailer using a cutting torch or other appropriate means.

Figure 3-3. Safety Chains

(3) Using grinder, remove excess material from trailer.

d. Repair. Repair is limited to replacement of hard ware. See Appendix B, Figure B-3, for appropriate part information.

e. Installation.

(1) Insert second link of the safety chain into the slot of the safety chain bracket.

CAUTION

While installing the safety chain bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with appropriate American Welding Standards (AWS) and local procedures.

(2) In accordance with local procedures, tack weld safety chain bracket to trailer. Verify installation after tack welding prior to installing a triple pass weld to brackets. Triple pass weld needs to be a total minimum fillet size of 3/8" to insure structural integrity of bracket attachment to frame.

(3) Prime and paint bare metal surfaces in accordance with local painting procedures.

3-5. LANDING LEG

a. Tools Required.

15/16" wrench and socket wrench
9/16" wrench and socket wrench

b. Equipment Condition.

Main frame rail supported with no weight bearing on landing legs.
Trailer empty of payload.
Brakes set (locked) and wheels chocked.

c. Removal.

WARNING

ENSURE THAT THE TRAILER IS COUPLED TO THE PRIME MOVER OR PROPERLY SUPPORTED SO THAT THE LANDING LEG IS OFF THE GROUND.

(1) Unbolt landing leg connecting shaft.

(2) Remove eight (8) bolts.

(3) Remove the landing leg (Figure 3-4) from the trailer.

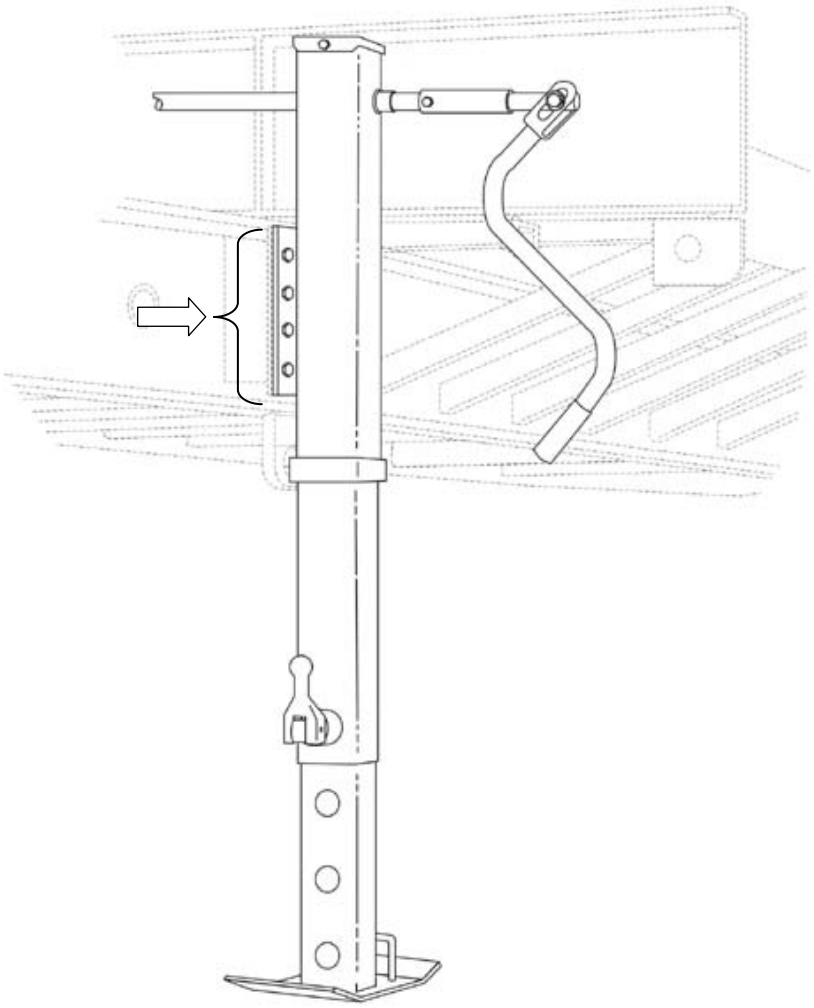


Figure 3-4. Landing Leg Bolts

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-4, for appropriate part information.

e. Installation.

(1) Install landing leg connecting shaft.

(2) Install eight (8) bolts and torque to 150 foot-pounds.

(3) Prime and paint bare metal surfaces in accordance with local painting procedures.

3-6. TRAILER FRAME

Submit a WIR any damage to the structural integrity of the trailer.

3-7. DECKING BOARDS

a. Tools Required.

Gloves
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Torx 40 screwdriver
9/32” drill bit

b. Equipment Condition.

Trailer empty.
Brakes set (locked) and wheels chocked.

c. Removal.

(1) Using Torx 40 driver, remove screws from damaged boards (Figure 3-5).

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-7, for appropriate part information.

Figure 3-5. Decking Board Screws in Frame

e. Installation.

(1) Cut board as per appendix B, Figure B-7.

(2) Place board in proper location.

(3) Mark the board from below through the holes in the frame.

(4) Remove board. Turn over and drill new pilot holes where marked.

(5) Flip board and put back in place.

(6) Start all screws into frame.

(7) Tighten screws into the deck so the head is 1/8 inch below the surface of the board.

3-8. CARGO TIE DOWNS (D-RING ASSEMBLIES)

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566

b. Equipment Condition.

Trailer empty.
Brakes set (locked) and wheels chocked.

c. Removal.

(1) Remove cotter pin.

(2) Remove nut from bolt.

(3) Remove bolt from assembly.

d. Repair. Repair is limited to replacement, See Appendix B, Figure B-8, for appropriate part information.

e. Installation.

(1) Assemble D-Link IAW Figure 3-6.

(2) Install nut on bolt.

(3) Install cotter pin.

Figure 3-6. Cargo Tie Down

3-9. TRAILER LIFTING AND TIE DOWN

a. Tools Required.

Oxyacetylene cutting torch/welder
Grinder

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Trailer empty and supported by landing legs.
Brakes set (locked) and wheels chocked.

c. Removal.

NOTE

CARC paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

CAUTION

While removing the trailer lift, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

(2) Remove trailer lift lug (Figure 3-7) from trailer using a cutting torch or other appropriate means.

(3) Using grinder, remove excess material from trailer.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-8, for appropriate part information.

e. Installation.

CAUTION

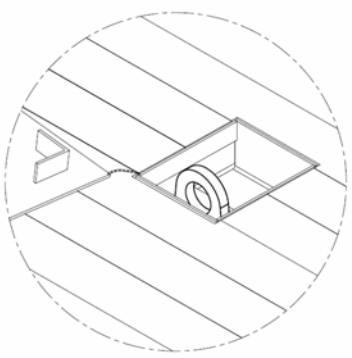
While installing the trailer lift, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with appropriate AWS and local procedures.

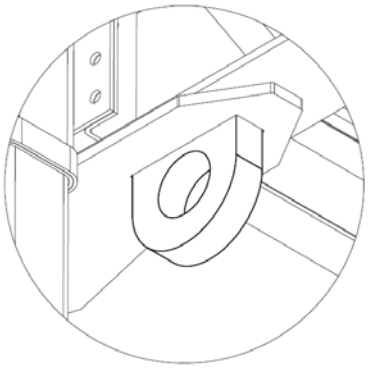
(1) In accordance with local procedures, weld trailer lift lug or tie down to trailer.

(2) Prime and paint bare metal surfaces in accordance with local painting procedures.

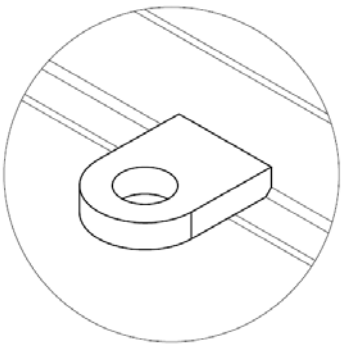


Forward Lifting Lug

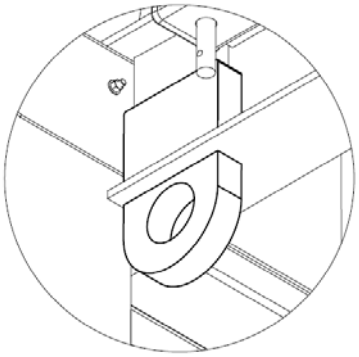
Rear Lifting Lug



Forward Tie Down



Supplemental Tie Down



Rear Tie Down

Figure 3-7. Forward, Supplemental and Rear Trailer Lifts and Tie Downs

3-10. REAR STABILIZER LEGS

a. Tools Required.

None

b. Equipment Condition.

Brake set (locked) and wheels chocked.

c. Removal.

(1) Remove lock pin.

(2) Remove stabilizer leg.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-5, for appropriate part information.

e. Installation.

(1) Install stabilizer leg into holder (Figure 3-8).

(2) Install lock pin.

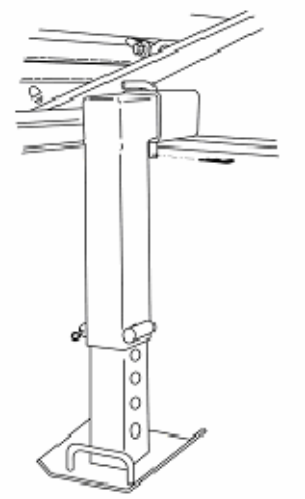


Figure 3-8. Rear Stabilizer Leg Down and Locked

Section IV. RAMPS

3-11. RAMPS

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Suitable Lifting Device

b. Equipment Condition.

Brakes set (locked) and wheels chocked.

c. Removal.

WARNING

RAMPS ARE HEAVY AND AWKWARD. USE CAUTION WHEN REMOVING AND HANDLING THEM TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

REMOVAL OF RAMP REQUIRES THE RAMP TO BE IN A NEAR VERTICAL POSITION TO REMOVE TENSION FROM THE RAMP HINGE SPRINGS. THE SPRING SHOULD BE LOOSE PRIOR TO REMOVAL OF RAMP. SERIOUS INJURY TO PERSONNEL MAY OCCUR IF THE RAMP IS REMOVED WHEN THE SPRING IS UNDER TENSION.

WARNING

LOADING RAMPS ARE KEY STRUCTURAL MEMBERS OF THE TRAILER. IMPROPER REPAIR OF RAMPS COULD CAUSE FAILURE DURING LOADING/UNLOADING OF EQUIPMENT RESULTING IN DAMAGE TO EQUIPMENT OR INJURY TO PERSONNEL.

(1) Setup davit with extension (Figure 3-9).

(2) Attach davit harness to ramp.

(3) Loosen chain and binder restraint assembly but do not remove.

(4) Using winch, raise ramp enough to remove tension.

Figure 3-9. Davit and Ramp

(5) Remove chain and binder restraint assembly.

(6) Remove nut and bolt from inboard end of the hinge pin (Figure 3-10) and slide hinge pin outboard and out of bracket. As hinge pin is removed, springs and hinge pin support eye assembly will drop free.

WARNING

DO NOT RELEASE WINCH HANDLE UNLESS RATCHET BINDER IS PROPERLY ENGAGED. DO NOT DISENGAGE RATCHET BINDER UNLESS TENSION IS APPLIED TO HANDLE. FAILURE TO OBSERVE THIS WARNING COULD CAUSE THE HANDLE TO SPIN OUT OF CONTROL AND CAUSE PERSONAL INJURY.

(7) Carefully remove and lower ramp from bracket.

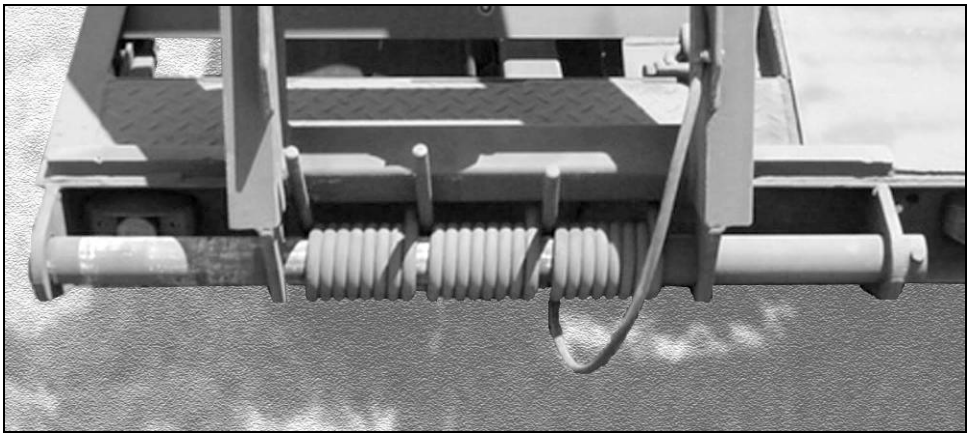


Figure 3-10. Ramp Hinge Pin and Springs

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-9, for appropriate part information.

e. Installation.

WARNING

RAMP IS HEAVY AND AWKWARD. USE CAUTION WHEN REMOVING AND HANDLING TO PREVENT INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT.

(1) Setup davit with extension.

(2) Attach harness to ramp.

(3) Raise ramp.

(4) Position ramp between hinge brackets in a vertical position while the hinge pin is inserted.

(5) Insert hinge pin through outboard hinge bracket on the trailer and into first hinge bracket on ramp.

(6) Position ramp springs ramp hinge pin support eye assembly and slide hinge pin through second hinge bracket on ramp and inboard hinge bracket on trailer.

(7) Ensure that springs are properly positioned. When properly installed, the springs will provide tension during the lowering of the ramp to the ground.

(8) Insert bolt through hole in ramp hinge pin and install locknut on bolt.

3-12. RAMP HINGE BRACKET

a. Tools Required.

Oxyacetylene cutting torch/welder
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Brakes set (locked) and wheels chocked.
Ramp removed (see 3-11. c.).

c. Removal (DS/3D).

CARC paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

(2) Mark location above and beside hinge bracket on trailer to aid in location of new hinge bracket, Figure 3-11.

CAUTION

While removing the ramp hinge bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

(3) Remove hinge bracket (Figurer 3-11) from trailer using a cutting torch or other appropriate means.

(4) Using a grinder, remove excess material from trailer.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-9, for appropriate part information.

e. Installation.

(1) If replacing one hinge bracket, use the following procedures:

(a) Insert hinge pin in existing bracket.

(b) Install new hinge bracket on other end of hinge pin.

(c) Position hinge bracket in accordance with marks.

(d) Have assistant hold hinge brackets in place with a wooden dowel.

(e) Check hinge pin to ensure that it is level.

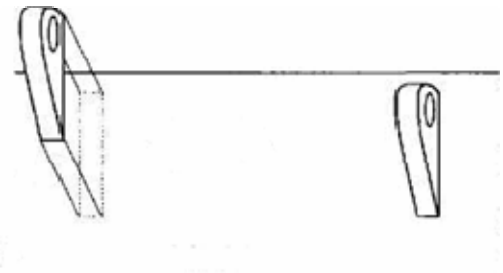


Figure 3-11. Hinge Bracket Repair

CAUTION

While installing the ramp hinge bracket, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with appropriate AWS and local procedures.

(f) In accordance with local procedures, tack weld hinge bracket to trailer.

(g) Position ramp between hinge brackets to ensure proper fit. Complete welds on hinge bracket.

(2) If replacing both hinge brackets, use the following procedures:

(a) Position outer hinge bracket in accordance with marks.

(b) Have assistant hold hinge bracket in place with a wooden dowel.

(c) In accordance with local procedures, tack weld hinge bracket to trailer.

(d) Insert hinge pin into outer hinge bracket. Install inner hinge bracket on other end of hinge pin.

(e) Position inner hinge bracket in accordance with marks.

(f) Have assistant hold inner hinge bracket in place with a wooden dowel.

(g) Check hinge pin to ensure that it is level.

(h) Tack weld inner hinge bracket to trailer.

(i) Support ramp with overhead crane and position ramp between hinge brackets to check for proper fit. Remove ramp and complete welds on hinge brackets.

(3) Prime and paint bare metal surfaces in accordance with local painting procedures.

3-13. RAMP TIE DOWN ASSEMBLIES

a. Tools Required.

Oxyacetylene cutting torch
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01 -238-8115

b. Equipment Condition.

Brakes set (locked) and wheels chocked.

c. Removal.

NOTE

CARC paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

(2) Remove chain (Figure 3-12) from ramp or beavertail using a cutting torch or other appropriate means.

CAUTION

While removing the ramp tie down assemblies, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. These procedures should only be performed by or under the supervision of trained personnel.

Figure 3-12. Ramp Tie Down Assembly

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-9, for appropriate part information.

e. Installation.

(1) Place chain link in recessed slot.

CAUTION

While installing the ramp tie down assemblies, extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are

worked on. These procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with the appropriate AWS and local procedures**.**

(2) Weld the bracket in place with the second link of the new chain positioned in slot.

(3) Prime and paint bare metal areas in accordance with local painting procedures.

CHAPTER 4
INTERMEDIATE LEVEL OF MAINTENANCE OF TIRES, WHEELS, BRAKES, SUSPENSION

Section I. INTRODUCTION

4-1. GENERAL

This chapter will address the 2nd LOM associated with the tires, wheels, brakes, and suspension components of the MTO20A1 trailer.

Section II. TROUBLESHOOTING

4-2. TROUBLESHOOTING PROCEDURES

Troubleshooting guidelines are provided as an aide in locating and correcting problems that occur during operation of the trailer. Check operator troubleshooting procedures prior to performing the procedures listed in Table 4-1. Perform the inspection procedures in the order listed for a particular item.

Table 4-1. Tires, Wheels, Brakes and Suspension Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
TIRES & WHEELS		
	Uneven wear on tread.	Check inflation (75 psi cold). Check suspension alignment and bushing wear.
	Excessive wear/wear bar is showing.	Replace tire in accordance with paragraph 4-5.
HUB ASSEMBLY		
Hub generates excessive heat.	Inspect for damaged brakes.	Adjust brakes.
	Inspect hub for damage.	Replace damaged hub components in accordance with paragraph 4-4.
	Inspect hub for improper binding or excessive end play.	Adjust hub and bearings in accordance with paragraph 4-4g.
	Inspect bearings for wear or damage.	Replace damaged or worn components in accordance with paragraph 4-4.

Table 4-1. Tires, Wheels, Brakes and Suspension Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
SUSPENSION		
Trailer does not track straight behind prime mover.	Inspect suspension components for damage.	See paragraph 4-18 for repair or replacement of suspension components.
BRAKES		
Brakes grab or bind.	Inspect brake shoes for damage or excessive wear.	Replace brake shoes in accordance with paragraph 4-7.
	Inspect petcock valve for leaks.	Replace petcock.
Brakes make excessive squealing or grinding noise when applied.	Inspect brake chambers for damage.	Adjust or replace brake chambers in accordance with paragraph 4-11.
Brakes fail to engage.	Check brake drums for debris.	Clean/remove debris.
	Check control (blue/service) air line connection at gladhand.	If no air is flowing from prime mover, problem is with prime mover.
	Inspect control air line for damage.	Repair or replace air lines or fittings in accordance with paragraph 4-15.
	Check for proper adjustment of brakes.	Adjust brakes in accordance with paragraph 4-13.
	Inspect brake drum for damage.	Replace brake drum in accordance with paragraph 4-3.
	Check brake system hardware for damaged or missing components.	Replace brake system components as necessary.
	Inspect camshaft for binding.	Grease zerks.
		Repair or replace camshaft in accordance with paragraph 4-8.
	Inspect ABS Relay valve for serviceability.	Replace ABS Relay valve in accordance with paragraph 4-10.
Trailer pulls to one side when braking.	Inspect brake shoe for damage or excessive wear.	Repair or replace brake shoe in accordance with paragraph 4-7.

Table 4-1. Tires, Wheels, Brakes and Suspension Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
	Inspect drum for excessive wear or damage.	Repair or replace brake drum in accordance with paragraph 4-3.
	Check brake tolerance.	Adjust brake if out of tolerance.
ABS WARNING LIGHT		
Warning light stays lit after the ABS is powered up.	Inspect brake shoes for damage or excessive wear.	Replace brake shoes in accordance with paragraph 4-7.
Warning light does not come on for 3 seconds when powered up. The light remains off.	Inspect spring brake chambers for damage.	Adjust or replace spring brake chambers in accordance with paragraph 4-11.
	Check control (blue/service) air line connection at gladhand.	If no air is flowing from prime mover, problem is with prime mover.
	Inspect control air line for damage.	Repair or replace air lines or fittings in accordance with paragraph 4-15.
	Inspect ABS relay valves for proper function.	Replace ABS relay valves in accordance with paragraph 4-10.
	Check for proper function of brakes.	Adjust brakes in accordance with paragraph 4-13.
	Inspect brake drum for damage.	Replace brake drum in accordance with paragraph 4-3.
	Check brake system hardware for damaged or missing components.	Replace brake system components as necessary.
	Inspect camshaft for binding	Lubricate camshaft. Repair or replace camshaft in accordance with paragraph 4-8.

Table 4-1. Tires, Wheels, Brakes and Suspension Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
AIR SYSTEM		
Air reservoir fails to fill with air.	Inspect air reservoir.	If damaged, repair in accordance with paragraph 4-16.
	Inspect air system on prime mover.	Refer to prime mover technical manual.
	Inspect gladhands for damage or incorrect coupling.	Disconnect, inspect, and reconnect gladhands. If damaged, repair in accordance with paragraph 4-14.
	Inspect air lines and connections for leaks. Feel for escaping air and/or use soapy water solution to detect leaks.	Tighten connections. Repair air lines or connections in accordance with paragraph 4-15.
	Inspect air reservoir for damage or leaks.	Tighten connections. Repair or replace reservoirs in accordance with paragraph 4-16.

Section III. BRAKES

4-3. BRAKE DRUMS

a. Tools Required.

Floor jack/Jack stands
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Trailer empty
Wheels chocked to prevent rolling
Tire Removed (Paragraph 2-24b)
Brake Caged (Paragraph 2-5h)

c. Removal.

WARNING

ALWAYS USE JACK STANDS OR OTHER FIELD EXPEDIENT MEANS TO SUPPORT THE TRAILER WHEN REMOVING A TIRE AND WHEEL ASSEMBLY. SERIOUS INJURY CAN RESULT IF THE JACK FAILS AND THE TRAILER IS NOT SUPPORTED.

(1) With the aid of an assistant, hold the outside of the brake drum (Figure 4-1) and attempt to remove by pulling straight out.

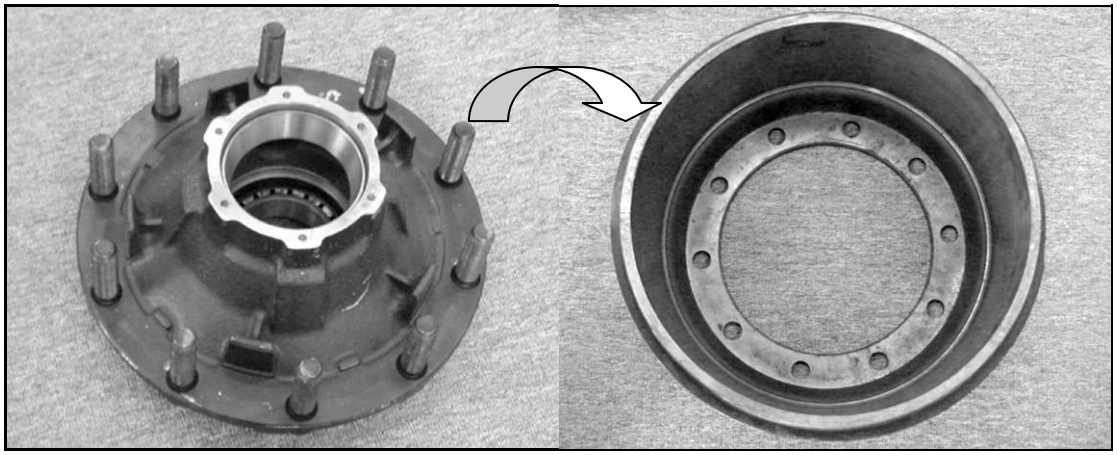


Figure 4-1. Removal of Brake Drum

(2) If the brake drum is worn, the brake shoes may prevent it from being removed easily. Use the following procedures if brake drum cannot be removed:

(a) Rotate the hex extension (1) on the automatic slack adjuster counterclockwise (Figure 4-2). Rotation of the hex extension should require at least 15 ft-lbs of torque and a ratcheting sound should be heard.

(b) Back off the hex extension only enough to allow the brake drum to clear the brake shoe linings.

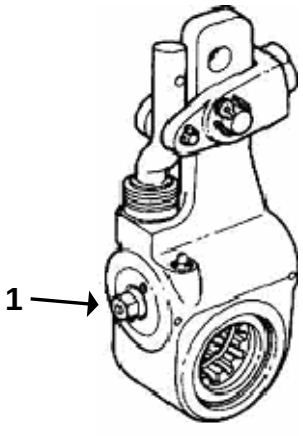


Figure 4-2. Automatic Slack Adjuster

CAUTION

Excess adjustment may cause damage to internal clutches.

(c) With the aid of an assistant, remove the brake drum.

d. Repair.

(1) Brake drum may be resurfaced to remove any surface irregularities or uneven wear.

(a) Check dimensional tolerances of brake drum in accordance with information contained on brake drum.

(b) If surface irregularities cannot be removed without exceeding brake drum tolerances, brake drum must be replaced.

(2) For replacement of hardware, see Appendix B, Figure B-15 and B-16, for appropriate part information.

e. Installation.

(1) With the aid of an assistant, install the brake drum by placing it on the hub. Align the studs with the holes in the brake drum and ensure that the brake drum is seated completely against the hub.

(2) Uncage the brakes using procedures in paragraph 2-5i.

NOTE

After removal of the brake drum, the brakes need to be adjusted to provide the proper running clearance between the brake lining and the drum.

(3) Rotate the hex extension (1) on the automatic slack adjuster clockwise until the brake linings contact the brake drum, Figure 4-2.

(4) Back off the automatic slack adjuster by rotating the hex extension one-half turn counterclockwise. A ratcheting sound will be heard.

(5) Replace trailer tire assembly using procedures in paragraph 2-24c.

4-4. HUB ASSEMBLIES

a. Tools Required.

Tool Kit Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Tool Kit, Organizational Maintenance, LVS, NSN 5180-01-247-1046
GAA
Dry Cleaning Solvent
Dial Indicator

b. Equipment Condition.

Wheels chocked.
Tire and wheel assembly removed (See paragraph 2-24b).
Brake caged (See paragraph 2-5h).
Brake drum removed (See paragraph 4-3c).

c. Removal.

(1) Remove bolts (1) and lock washers (2) from hub cap (3) (Figure 4-3).

(2) Remove hub cap (3) and gasket (4). Discard gasket (4).

(3) Straighten tab on star washer (6). Remove outer spindle nut (5), star washer (6), index washer (7), and the inner spindle nut (8).

(4) Pull hub assembly (11) forward slightly, then push back to expose outer bearing (9). Remove outer bearing (9).

CAUTION

Do not pry against tone ring or sensor block.

(5) Remove hub (11) from spindle.

(6) If inner bearing will be replaced, use a hammer and brass drift pin to remove inner bearing race (10) and seal (12) from hub (11). If inner bearing will be reused, use a seal puller.

(7) Remove inner and outer bearing races (10 and 13) from hub (11). Position the hub (11) in a vise and use a hammer and brass drift pin to remove bearing races.

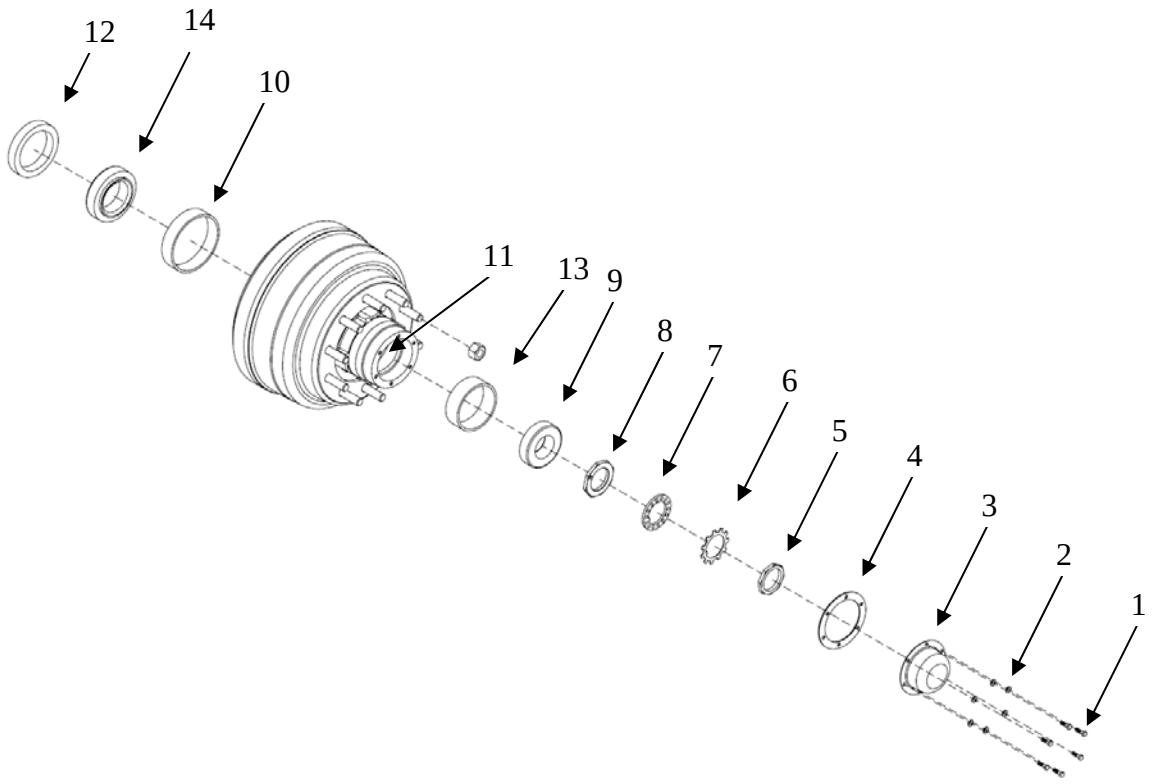


Figure 4-3. Removal of Hub

d. Cleaning.

(1) Remove buildup of dirt and grease by wiping with a soft cloth.

WARNING

DRY CLEANING SOLVENT IS BOTH TOXIC AND FLAMMABLE. AVOID PROLONGED BREATHING OF VAPORS. AVOID SKIN CONTACT. USE ONLY IN WELL VENTILATED AREA. KEEP AWAY FROM FLAME.

(2) Using a clean, soft cloth, thoroughly clean all parts with dry cleaning solvent.

WARNING

PARTICLES BLOWN BY COMPRESSED AIR ARE HAZARDOUS. MAKE CERTAIN THE AIR STREAM IS DIRECTED AWAY FROM USER AND OTHER PERSONNEL IN THE AREA. TO PREVENT INJURY, USER MUST WEAR PROTECTIVE GOGGLES OR FACE SHIELD WHEN USING COMPRESSED AIR.

CAUTION

Do not dry bearings with high pressure compressed air. Spinning dry bearings will cause damage. Use compressed air that has been filtered for moisture only. Unfiltered air will not completely dry parts and may allow corrosion.

(3) Dry all metal parts with low pressure, filtered, compressed air.

e. Inspection.

(1) Inspect flange areas and hub for cracks.

(2) Check bearings for cracks, wear, or pitting on rollers.

(3) Inspect bearing races for pits, grooves, or flaking.

(4) Inspect studs for damaged threads or breaks.

(5) Inspect spindle for pitting and grooves. If spindle is damaged, evacuate to depot.

f. Repair.

(1) Repair is limited to replacement of damaged parts identified from the inspection. See Appendix B, Figure B-14, for appropriate part information.

NOTE

Replace damaged or broken studs in groups of three; the damaged or broken stud plus the studs on either side.

g. Installation.

(1) Use these procedures to install new studs.

(a) Place one nut over another nut on stud and lock together.

(b) Ensure that top nut is slightly beyond the end of the stud.

(c) Strike top nut with a hammer to drive stud out of hub.

(d) Insert a new stud through hub. Place a nut on the new stud and tighten down completely, pulling stud through the hub and seating it.

(2) Using a brass drift pin, install inner and outer bearing races in hub.

(3) Pack inner and outer bearings with grease using one of the following methods:

(a) Pack bearings using a pressure packer, if available.

(b) Otherwise, force the grease, by hand, into the cavities between the rollers and cage from the large end of the cone.

(4) Pack the hub cavity between the bearing races with grease to the level of the smallest diameter of the races.

(5) Install inner bearing in hub. Install new seal using seal installer from the LVS Tool Kit.

CAUTION

Hub must be carefully aligned on the spindle when installed and securely supported throughout procedure. Failure to align and support hub may cause damage to the seal.

(6) Install hub on spindle.

(7) Have assistant support the hub until the outer bearing and inner spindle nut (8) are installed. Install the outer bearing and inner spindle nut with tab (dowel) facing outward. Tighten inner spindle nut until it is snug against the outer bearing.

(8) Tighten the inner spindle nut to 100 ft-lbs of torque while rotating the hub in BOTH directions.

(9) Completely loosen the nut and then tighten it to 50 ft lbs while rotating the hub.

(10) Back off the inner spindle nut 1/4 turn but be careful not to turn the hub. Install inner spacer. If indexing hole does not align turnover inner spacer, Figure 4-4. Adjust inner spindle nut so that dowel on nut aligns with hole on inner spacer.

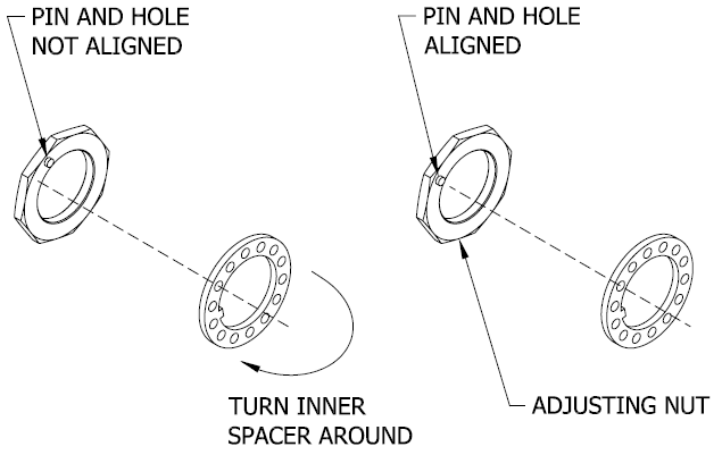


Figure 4-4. Installing the Spindle nut.

(11) Install the star washer and outer spindle nut. Tighten spindle nut to 250-300 ft-lbs. Bend 2 or 3 tabs on star washer over flats of outer spindle nut.

(12) Check bearing adjustment with dial indicator. Adjustment should be 0.001 to 0.010 inches of end play. Hub should rotate freely without excess play.

(13) If hub binds or has excessive end play, loosen spindle nut and repeat steps 7 through 12.

(14) Install new gasket on hub cap.

(15) Install hub cap.

(16) Secure hub cap to hub with six lock washers and bolts. Tighten bolts to 10-15 ft-lbs.

(17) Install brake drum tightly utilizing three lug nuts to hold the drum in place.

(18) Adjust brakes (See paragraph 4-13).

(19) Install tire and rim assemblies.

(20) Uncage brakes using procedures in paragraph 2-5i.

4-5. TIRE AND WHEELS

a. Tools Required.

Tool Kit Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Tire removed from trailer.
Brake caged (See paragraph 2-5h).
Remove valve core.

c. Demounting.

(1) Remove the valve core and completely deflate the tire.

(2) Lay assembly on the floor. Make sure that all the air is out of the tire before proceeding.

(3) Using a bead breaker, deseat the bead from the rim.

(4) After the bead has been released completely around the tire, remove the rim.

WARNING

ALWAYS CHECK TIRE/RIM ASSEMBLY FOR PROPER COMPONENT SEATING PRIOR TO REMOVING FROM VEHICLE.

ALWAYS DEFLATE TIRE COMPLETELY BY REMOVING VALVE CORE BEFORE REMOVING TIRE AND RIM ASSEMBLY FROM VEHICLE, IF THE TIRE HAS BEEN RUN AT 80% OR LESS OF ITS RECOMMENDED OPERATING PRESSURE, OR WHEN THERE IS OBVIOUS OR SUSPECTED DAMAGE TO THE TIRE OR WHEEL.

ALWAYS REMOVE VALVE CORE AND DEFLATE TIRE COMPLETELY BEFORE ASSEMBLY OF COMPONENTS.

ALWAYS FOLLOW THE MOUNTING AND DEMOUNTING PROCEDURES OUTLINED.

ALWAYS USE SPECIALIZED TOOLS AS RECOMMENDED FOR MOUNTING AND DEMOUNTING OF TIRES.

NEVER LEAN, STAND OR REACH OVER TIRE/RIM ASSEMBLY DURING INFLATION.

NEVER HAMMER ON COMPONENTS OF AN INFLATED OR PARTIALLY INFLATED ASSEMBLY.

NEVER ATTEMPT TO UNSEAT BEADS OF AN INFLATED TIRE.

d. Mounting.

WARNING

ALWAYS FOLLOW THE MOUNTING AND DEMOUNTING PROCEDURES OUTLINED AND USE SPECIALIZED TOOLS AS RECOMMENDED FOR MOUNTING AND DEMOUNTING OF TIRES. NEVER LEAN, STAND OR REACH OVER TIRE/RIM ASSEMBLY DURING INFLATION. NEVER HAMMER ON COMPONENTS OF AN INFLATED OR PARTIALLY INFLATED ASSEMBLY.

ALWAYS SELECT THE PROPER TIRE SIZE AND CONSTRUCTION TO MATCH THE MANUFACTURERS RIM OR WHEEL RATING AND SIZE. ALWAYS CHECK RIM DIAMETER TO BE SURE IT EXACTLY MATCHES RIM DIAMETER MOLDED ON TIRE. ALWAYS CLEAN AND INSPECT RIM AND ALWAYS BE SURE RIM COMPONENTS ARE PROPERLY MATCHED.

NEVER MOUNT OR USE DAMAGED TIRES, TUBES OR RIMS OR USE A RIM/WHEEL COMPONENT WHICH CANNOT BE IDENTIFIED. NEVER REWORK, WELD, HEAT OR BRAZE RIMS.

ALWAYS INSPECT INSIDE OF TIRE FOR LOOSE CORDS, CUTS, PENETRATING OBJECTS, OR OTHER CARCASS DAMAGE. TIRES WITH UNREPAIRABLE DAMAGE SHOULD BE DISCARDED.

ALWAYS BE SURE THAT RIM COMPONENTS ARE PROPERLY SEATED BEFORE INFLATING.

ALWAYS USE SAFETY CAGE OR OTHER EQUIVALENT RESTRAINING DEVICE WHEN INFLATING THE TIRE TO SEAT THE BEADS AND/OR INFLATING THE TIRE TO NORMAL OPERATING INFLATION PRESSURE.

ALWAYS INSPECT VALVE CORES FOR PROPER AIR RETENTION. REPLACE DAMAGED OR LEAKY CORES.

ALWAYS USE REMOTE INFLATION EQUIPMENT CONSISTING OF AN EXTENSION HOSE WITH A CLIP—ON CHUCK AND IN—LINE VALVE WITH GAUGE OR PRE—SET PRESSURE REGULATOR; OPERATOR MUST STAND CLEAR OF TRAJECTORY DURING INFLATION.

NEVER—INFLATE OR ADD INFLATION PRESSURE TO A TIRE THAT HAS BEEN FLAT OR SERIOUSLY UNDERINFLATED WITHOUT REMOVING AND CHECKING FOR TIRE OR RIM DAMAGE.

(1) Check to see if all parts are there.

(2) Lay wheel assembly on blocks or mounting stand or a demounted 20 X 10 rim base.

(3) Inspect all parts before starting to mount.

(4) Install valve stem with long stem of valve through valve access hole and lay wheel down.

WARNING

ALWAYS LUBRICATE WITH ONLY APPROVED TIRE MOUNTING LUBRICANT. NEVER USE ANTI—FREEZE, SILICONES OR PETROLEUM—BASE LUBRICANTS.

(5) Lubricate the tire beads and rim with tire lubricant.

(6) Lay the tire over the rim and slide on.

(7) Pick the tire and wheel assembly up. Roll the tire and wheel assembly into the tire cage and secure the tire in the cage. Using a remote air chuck inflate the tire. For safety reasons be sure to stand off to the side while doing this procedure.

WARNING

ALWAYS INFLATE TIRE TO TIRE MANUFACTURER'S RECOMMENDED COLD OPERATING PRESSURE.

(8) Inflate the tire to 75 psi.

(9) Check inflation with a pressure gauge and adjust as needed to recommended inflation.

(10) Remove the tire from the cage.

(11) If a tire has not seated properly and is leaking air, place it back in the tire cage and continue to inflate tire to 85 psi. If tire seats and stops leaking, deflate tire to 75 psi.

(12) If the tire does not seat and stop leaking, demount thoroughly relubricate the tire beads and rim, and remount the tire.

Section IV. BRAKE ASSEMBLIES

4-6. INTRODUCTION

a. General.

(1) When the brake system of the trailer is properly connected to the service brake system of the prime mover, the service brake pedal on the prime mover controls the brakes on both vehicles. All components needed to produce and maintain a constant supply of compressed air are located on the prime mover and must operate effectively to ensure proper performance of the trailer brakes.

(2) The following paragraphs describe the various components of the air brake system found on this trailer. The brake system consists of brakes, slack adjusters, control (service) air line, supply (emergency) air line, ABS relay valves, spring brake control valve, air reservoir, brake chambers and connections.

b. Brakes.

(1) The brakes are air actuated. Air pressure is used to operate the air chambers at the trailer wheels. The brakes are applied in proportion to the foot pressure applied to the brake pedal of the prime mover.

(2) The brakes are located within the brake drums. Each brake drum has two brake shoes. The outer surfaces of the brake shoes are fitted with brake linings. Each shoe is anchored at one end to an anchor pin on which it pivots. The other end of each shoe is pushed out as the brakes are applied.

(3) An S-shaped cam on the end of the camshaft is mounted between the free ends of the two brake shoes. Rotation of the cam forces the shoes out causing the brake linings to contact the drum.

(4) A brake shoe tension spring, near the free ends of the brake shoes, retracts the brake shoes from the drum and holds them in a retracted position until the brakes are applied.

c. Automatic Slack Adjuster. The automatic slack adjuster is mounted on the brake camshaft and is connected to the air chamber by a push rod. Air application to the brake chamber moves the push rod, which moves the automatic slack adjuster, which rotates the camshaft, causing the s-cam to press the brake shoes against the brake drum. The automatic slack adjuster compensates for brake wear during use to maintain optimum contact between the brake shoes and drum.

d. Spring Brake Chamber. The spring brake chamber is mounted on the axle adjacent to each wheel position. The chamber converts air pressure into mechanical motion to operate the automatic slack adjuster when applying brakes. The spring brake chamber will automatically lock in the event of air pressure loss.

e. Control (Service) Air Line. The control (service) air line on the trailer extends from the gladhand (color coded blue) on the drawbar to a "T" coupling at the forward control valve and then to the forward ABS relay valve (two-port). The air line then continues to the rear ABS relay valve (four-port) and the rear spring brake control valve. When the brakes are applied in the prime mover, the change in air pressure causes the ABS relay valves to open, which allows air from the reservoir to be supplied for application of the brakes. Air is only supplied through the control air line during prime mover brake application.

f. Supply (Emergency) Air Line. The supply (emergency) air line on the trailer extends from the gladhand (color coded red), on the topside of the drawbar of the trailer to the spring brake control valve. From the spring brake control valve, the air line supplies air to the reservoir and the spring brake chambers for operation of the emergency (parking) brake. Air supply through the supply air line is consistent with the air pressure in the prime mover when properly connected to the prime mover.

g. ABS Relay Valves. The ABS relay valves controls the service brakes on the trailer. The relay valve provides braking action by releasing air from the trailer air reservoir directly to the service brake chambers. When the control (service) brakes are applied, the change in air pressure signals the relay valves to open, allowing air to flow from the reservoir to the service brake chambers, which applies the brakes. There are two ABS relay valves on the trailer, both have two delivery ports. The relay valves are mounted on the air reservoir, one supplies air to the front axle service brake chambers and one supplies air to the rear axle service brake chambers.

h. Spring Brake Control (RT4) Valve.

(1) In compliance with FMVSS 121, this trailer is equipped with a service reservoir priority system. The spring brake control valve determines the allocation of air when the pressure in the system is low. If air pressure is below 50 psi, the spring brakes will be activated (locked). When air is supplied to the trailer, via the supply (emergency/red) air line, the spring brake control valve sends air to the reservoir first. When air pressure reaches 80-82 psi, the air is directed to the spring brakes, which will release them. There is one spring brake control (RT4) valve, located rear of the air reservoir.

(2) The spring brake control (RT4) valve also prevents anti-compounding. This prevents the simultaneous applications of the control (service) brakes and emergency (parking) brakes, to prevent over torque of the brakes and damage to the brake system. If the spring brakes are set, the control valve prevents the air pressure signal from the service air line from being transmitted to the ABS relay valve.

i. Air Reservoir.

(1) There is one air reservoir mounted between the main frame rails the axles. The air reservoir provides the supply of air through the relay valve for applying the brakes.

(2) The air reservoir is equipped with a spring-loaded petcock valve which is routed to a remote lanyard on the driver’s side of the trailer. The drain valve allows for draining accumulations of moisture and releasing air pressure in the trailer brake system.

4-7. BRAKE SHOES

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Dry cleaning solvent

b. Equipment Condition.

Trailer supported by jack stands.
Tire assembly removed.
Brake caged (See paragraph 2-5h).
Brake drum removed (See paragraph 4-3c).

c. Removal.

WARNING

BRAKES AND SPRINGS ARE UNDER TENSION. USE CAUTION WHEN REMOVING. INJURY MAY RESULT FROM IMPROPER REMOVAL OF BRAKE SHOES.

ENSURE TO USE CHOCK BLOCKS BEFORE WORKING ON BRAKES.

(1) Utilizing pry bar lift top shoe (1) upward to disengage anchor end of shoe from the anchor pin (2). Remove anchor pin (2) from spider (3).

(2) Repeat this procedure for the bottom shoe (4).

(3) Remove the two brake keeper springs (5) which should be free of tension.

(4) Unwrap the bottom shoe (4) by pivoting the shoe on the camshaft head (6) and twisting the shoe 90° under the spindle (7). Remove the shoe assemblies (1 and 4) from the spider (3).

d. Cleaning and Inspection.

WARNING

DRY CLEANING SOLVENT IS BOTH TOXIC AND FLAMMABLE. AVOID PROLONGED BREATHING OF VAPORS. AVOID SKIN CONTACT. USE IN WELL VENTILATED AREA. KEEP AWAY FROM FLAMES.

CAUTION

Do not get grease, oil, solvent, or fingerprints on brake lining surfaces. This will cause glazed brake linings and uneven braking.

(1) Using dry cleaning solvent and brush, clean brake springs (5 and 8), camshaft head (6) and anchor pins (2).

(2) Inspect brake linings (1 and 4) for damage and wear. If brake linings are worn to within 1/16 inch of rivet heads, replace brake shoes.

(3) Inspect brake drum for cracks, warping, scoring or other damage and wear.

(4) Check camshaft head (6) for wear or damage. If worn or damaged, replace in accordance with instructions in paragraph 4-7.

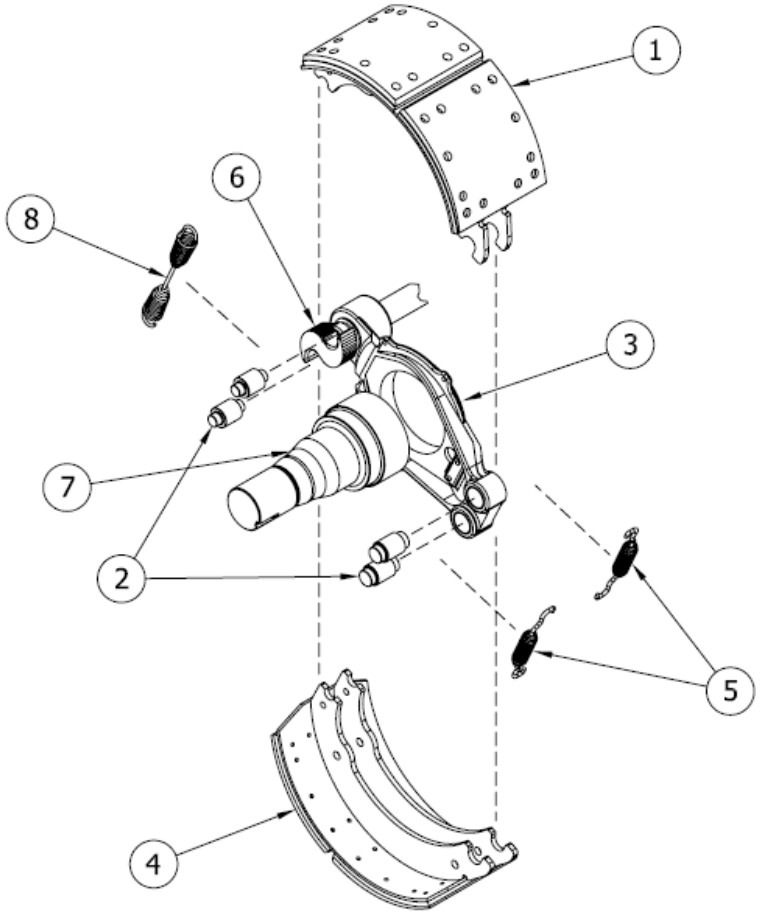


Figure 4-5. Brake Shoe Removal

e. Repair. Repair is limited to replacement of hardware.

(1) The brake shoe change kit contains all necessary hardware (see Appendix B, Figure B-17 and B-18, for complete list) to complete a brake shoe replacement and simplifies parts ordering.

(2) Replacement of all hardware identified in change kit is mandatory when changing shoes.

f. Installation.

WARNING

USE CARE WHEN INSTALLING SPRINGS. SPRINGS ARE UNDER TENSION AND WHEN RELEASED, MAY FLY OFF, CAUSING INJURY TO PERSONNEL.

(1) Lubricate the cam roller notches and anchor pin notches on the brake shoes with anti-seize lubricant. Install the cam rollers and retainers on to new shoes.

(2) Install the "W" shaped retractor spring retainer pins in shoe webs near the camshaft end.

(3) Install the retractor spring between the shoes. Place the top shoe onto the spider. Pivot the bottom shoe on the camshaft head and twist the shoe 90° under the spindle.

(4) Install two brake shoe keeper springs on the anchor end of the shoes.

(5) Lubricate the anchor pin bores with anti-seize lubricant.

(6) Lift the top shoe upwards to clear the anchor pin hole. Install the anchor pin.

(7) Utilizing pry bar repeat step (6) for bottom shoe.

(8) Install brake drum tightly utilizing three lug nuts to hold the drum in place.

g. Adjustment. When the brake shoes are replaced, a brake adjustment/check is required. See paragraph 4-13 for instructions on proper adjustment of brake system components.

4-8. BRAKE CAMSHAFTS (S-CAMS)

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
GAA

b. Equipment Condition.

Trailer on jack stands.
Brakes caged (See paragraph 2-5h).
Brake drum removed (See paragraph 4-3).
Brake shoes removed (See paragraph 4-7).
Slack adjusters removed (See paragraph 4-9).
Hub assembly removed (See paragraph 4-4).
Wheels chocked.

WARNING

BRAKES AND SPRINGS ARE UNDER TENSION. USE CAUTION WHEN REMOVING. INJURY MAY RESULT FROM IMPROPER REMOVAL OF BRAKE SHOES.

ENSURE TO USE CHOCK BLOCKS BEFORE WORKING ON BRAKES.

c. Removal. See Figure 4-6 for part locations.

(1) Remove two cotter pins and two clevis pins (21) from the automatic slack adjuster (22).

(2) Remove snap ring (17) and washer (16).

(3) Remove automatic slack adjuster (22).

(4) Remove and slide snap ring (10) to opposite end of S-cam (18 & 19).

(5) Remove cam shaft (18 & 19), snap ring (10) and washer (9).

(6) Remove grease zerk (8).

(7) Remove and discard inner and outer seal (6) and bushing (7).

(8) Remove four bolts (15) and nuts (11) from the inner cam shaft supporting bracket (13) and bushing (14) from outer cam shaft supporting bracket (13).

d. Repair.

Remove surface rust from machined surfaces. Repair is limited to replacement of hardware. See Appendix B, Figure B-15, for appropriate part information.

e. Inspect.

(1) Check S-cam head for flat spots, grooves, breaks and chips.

(2) Check bearing journals and spline.

f. Installation.

CAUTION

When installing camshaft seals, the seal on the slack adjuster side is installed with seal facing into the spider. This allows grease to purge outside the brake assembly when greasing the camshaft bushing. It also aids to avoid damage of the seal lips when camshaft is installed.

(1) Install new inner seal (6), bushing (7), and outer seal (6) with seals facing same outboard direction, see Figure 4-6.

(2) Install grease zerk (8).

(3) Slide 1.5" x .120" washer (5) onto camshaft to S-cam head (18 & 19).

(4) Install inner cam shaft support bushing (14) and assemble retainer plates with four screws (15), nuts (11) and washers (12). Torque nuts to 3-4 ft lbs.

(5) Slide camshaft (18 & 19) approximately two inches (5 cm) through spider (23). Place washer and snap ring on camshaft. Slide camshaft (18 & 19) the rest of the way through spider (23) and inner camshaft support bushing (7).

(6) Install automatic slack adjuster (22), clevis pins and cotter pins (21), washer (16) and snap ring (17).

(7) Lubricate grease fittings (8) in accordance with the lubrication chart found in Appendix E.

(8) Install brake shoes (see paragraph 4-7).

NOTE

The automatic slack adjuster adjustment may need to be backed off to properly seat brake shoes into the anchor pin rollers and S-cam head.

(9) Install brake drum and hub (see paragraphs 4-3 and 4-4).

(10) Install tires and wheels.

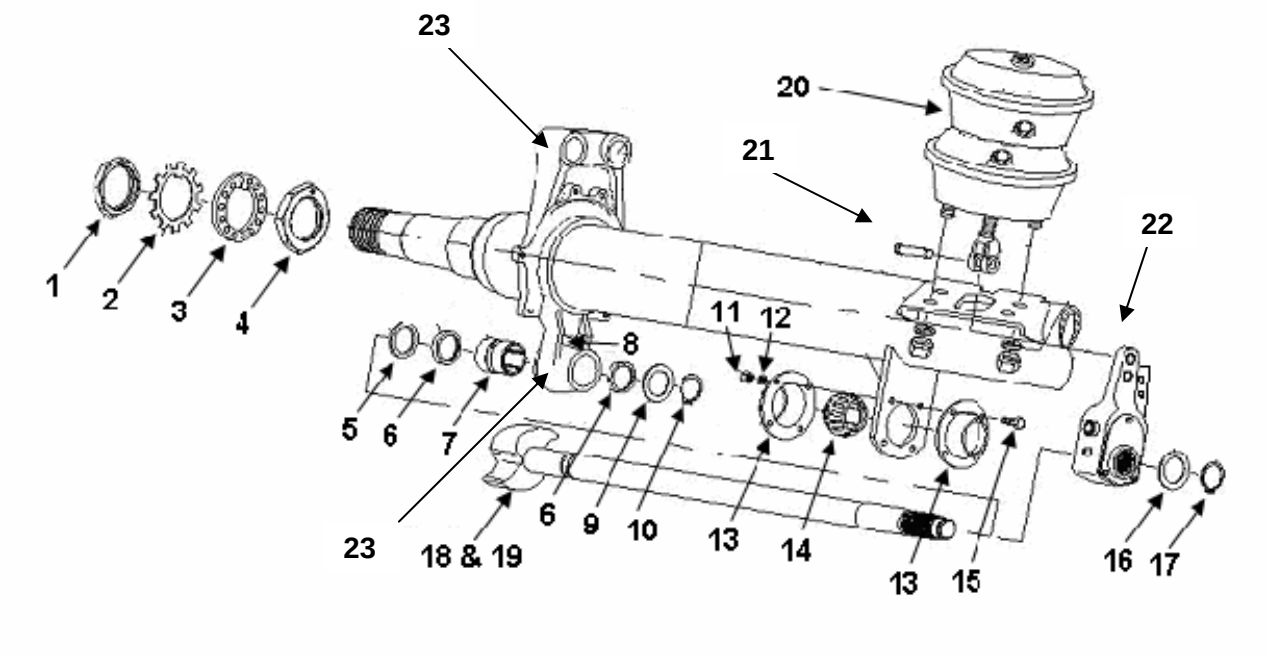


Figure 4-6. S-Cam Removal

(11) Close drain petcocks on air reservoir.

(12) Adjust brakes (see paragraph 4-13).

4-9. AUTOMATIC SLACK ADJUSTERS

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Wheels chocked.
Brake caged (see paragraph 2-5h).

c. Removal.

(1) Remove cotter pins from the ¼ inch clevis pin (1) and ½ inch clevis pin (2). Remove ¼ inch clevis pin (1) and ½ inch clevis pin (2) (See Figure 4-7).

(2) Rotate slack adjuster (3) out of clevis (4).

(a) If wheel/brakes are removed, S-cam shaft turns freely.

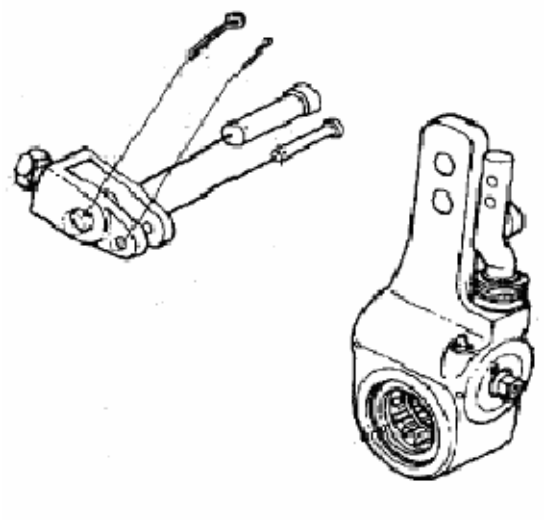


Figure 4-7. Removal of Cotter Pins

(b) If brakes are in place, rotate hex extension on slack adjuster counterclockwise to back slack adjuster out of clevis.

(3) Remove snap ring and washer from camshaft.

(4) Using hammer and brass drift, tap slack adjuster until it comes off camshaft.

NOTE

When installing or replacing an automatic slack adjuster, a new clevis shall be installed.

(5) Note the position of the clevis by measurement or by marking the location on the push rod for use during reassembly.

(6) Loosen and remove the clevis by unscrewing it from the push rod.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-16, for appropriate part information.

e. Installation.

(1) With the jam nut (1) in place on the push rod (2), install the clevis (Item 4, Figure 4-7) on the spring brake chamber push rod at the same location noted in paragraph c.(5). above.

(2) Install automatic slack adjuster (Item 3, Figure 4-7) onto the camshaft. Install washer and snap ring.

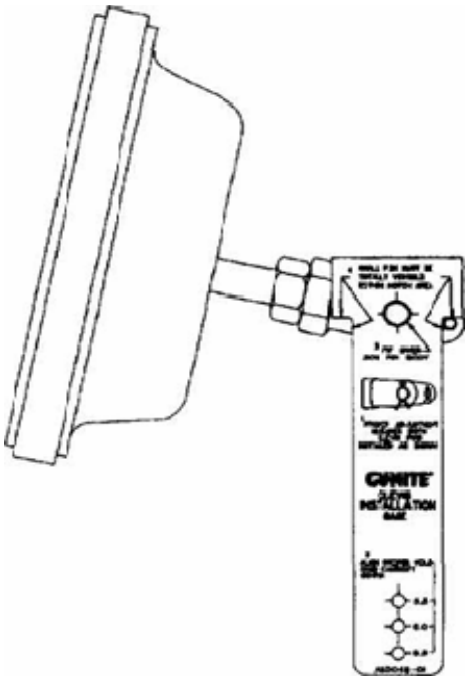


Figure 4-8. Spring Brake Push Rod and Clevis Adjustment

(3) Turn hex extension nut clockwise, rotating the slack adjuster, until the 1/4 inch hole in the slack adjuster aligns with the 1/4 inch hole in the clevis. Install the 1/4 inch pin and the cotter pin (See Figure 4-8).

NOTE

Tapping the clevis downward moves the link into the slack housing. If alignment is not achieved when the link bottoms out, it indicates improper clevis installation. Downward movement of the link requires only light tapping.

(4) Tap the clevis upward or downward until the large hole in the slack arm aligns with the large hole in the clevis. Install clevis pin and cotter pin.

NOTE

Failure to tighten the jam nut will allow the air chamber push rod to rotate in the clevis and change the installed position of the slack adjuster, preventing proper automatic adjuster function.

(5) Tighten the jam nut to 40-50 ft-lbs of torque against the clevis.

f. Adjustment. When an automatic slack adjuster is replaced, a brake adjustment is required. See paragraph 4-9e for instructions on proper adjustment of brake system components.

4-10. ABS RELAY VALVE

a. Tools Required.

Teflon paste pipe sealant
Tags
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Air drained from brake system.

c. Removal.

(1) Tag and disconnect air lines from spring ABS relay valve, Figure 4-9.

(2) Remove ABS relay valve from air reservoir.

(3) Remove all air fittings from the ABS relay valve.

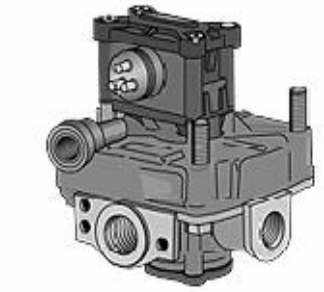


Figure 4-9. ABS Relay Valve

d. Repair. Repair is limited to replacement of hardware. See Appendix B. Figure B-20 for appropriate part information.

e. Installation.

NOTE

Apply Teflon paste pipe sealant to threads.

(1) Install all air fittings from the ABS relay valve using Teflon paste on all treaded fittings.

(2) Install the ABS relay valve on the air reservoir.

(3) Reconnect air lines to the ABS relay valve as per the tagging and Figure 4-9.

(4) Charge air system.

(5) Check for leaks.

(6) Check operation of brakes.

4-11. SPRING BRAKE CHAMBERS

a. Tools Required.

Tags
Tool Kit, Mechanics General
Tool Set, Common Set No. 1

b. Equipment Condition.

Wheels chocked to prevent rolling.
Brake caged at spring brake chamber positions that will be serviced (paragraph 2-5h).
Drain air from brake system.

c. Removal.

(1) Tag and disconnect air hoses (1) (Figure 4-10).

(2) Remove automatic slack adjuster as per paragraph 4-9, part c.

(3) Remove nuts (5) and washers (4) from spring brake chamber mounting studs (Figure 4-10).

(4) Remove spring brake chamber (2) from trailer.

(5) Remove clevis (3) from spring brake chamber push rod.

(6) Mark mounting holes on brackets for re-assembly.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-20 for appropriate part information.

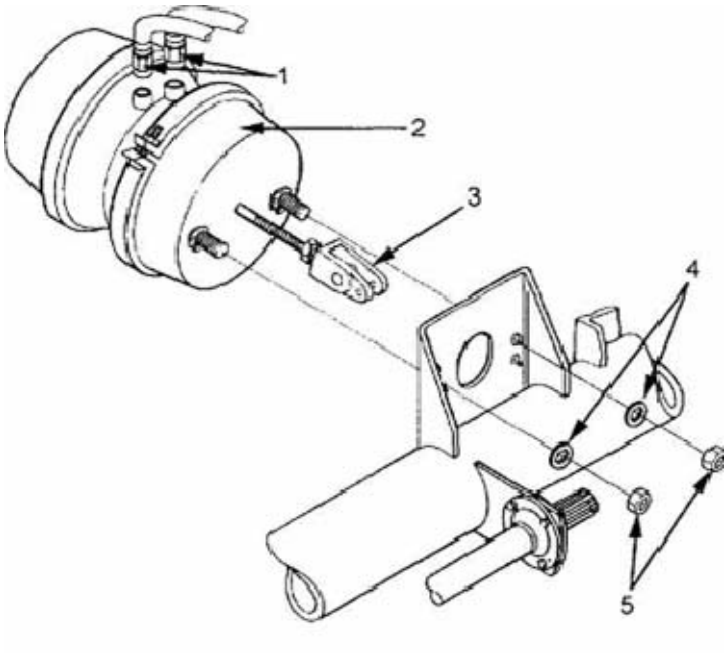


Figure 4-10. Spring Brake Chamber Removal

e. Installation.

WARNING

THE SPRING BRAKE CHAMBER CONTAINS A SPRING UNDER HIGH PRESSURE. TO PREVENT PERSONNEL INJURY OR DEATH, NEVER WORK DIRECTLY BEHIND THE SPRING BRAKE CHAMBER. IF CAGING BOLT WILL NOT ENGAGE PROPERLY, THE SPRING MAY BE BROKEN - DO NOT CONTINUE CAGING PROCEDURES.

(1) Install spring brake chamber (2) in position (Figure 4-10). Ensure to slip the threaded attachment rods through diagonally opposite holes in the bracket (one in a top hole and one in a lower hole)

(2) Install washers (4) and nuts (5) on spring brake chamber mounting studs. Torque to 85-95 ft. lbs.

(3) Ensure that the spring brake chamber is caged.

(4) Verify that the push rod length is 5.76 inches long. If it is longer, cut to 5.76 inches. The total rod cut length should be 7.00 inches (Figure 4-11).

(5) Install clevis on spring brake chamber push rod.

(a) Install the jam nut on the push rod.

(b) Install the clevis on the push rod.

(c) The measurement from the face of the changer to the center is ½ inch. The clevis pin is 7.00 inches.

(d) Torque the jam just to 40-50 ft-lbs against the clevis.

(e) Connect clevis to clevis nut.

(6) Check the push rod length.

(a) If the push rod extends through the clevis more than 1/8 inch, it is too long. Mark the push rod, remove the clevis, and cut the push rod to length.

(b) If the push rod does not extend completely through the clevis (full thread engagement), it is too short. The spring brake chamber must be replaced.

(7) Install slack adjuster as per paragraph 4-9e.

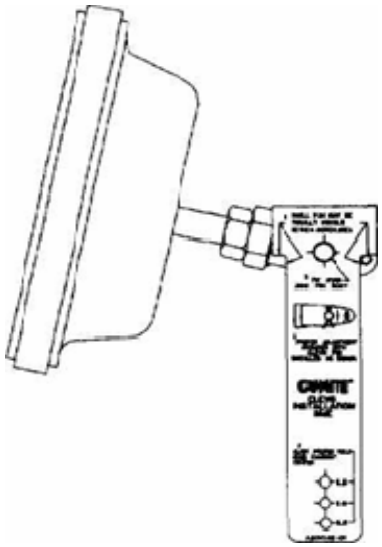


Figure 4-11. Spring Brake Push Rod and Clevis Adjustment

(8) Connect air hoses to spring brake chamber.

(9) Inspect air lines and connections for leaks. Feel for escaping air and/or use soapy water solution to detect leaks.

(10) Check adjustment of brakes.

4-12. SPRING BRAKE CONTROL VALVE (RT4)

a. Tools Required.

Pipe sealant
Tags
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

Air drained from brake system.

NOTE

The procedures for removal and installation of the forward and rear spring brake control valves are the same with the exception of the number of air lines disconnected and connected.

c. Removal.

(1) Tag and disconnect air lines from spring brake control valve (Figure 4-13).

(2) Remove spring brake control (RT4) valve from trailer.

(3) Remove all air fittings from the spring brake control (RT4) valve.

d. Repair. Repair is limited to replacement of hardware. See Appendix B. Figure B-20, for appropriate part information.

e. Installation.

NOTE

Apply pipe sealant to threads.

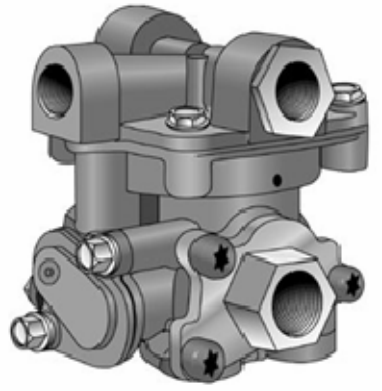


Figure 4-12. Spring Brake Control (RT4) Valve

(1) Install all air fittings from the spring brake control (RT4) valve using pipe sealant on all threaded fittings.

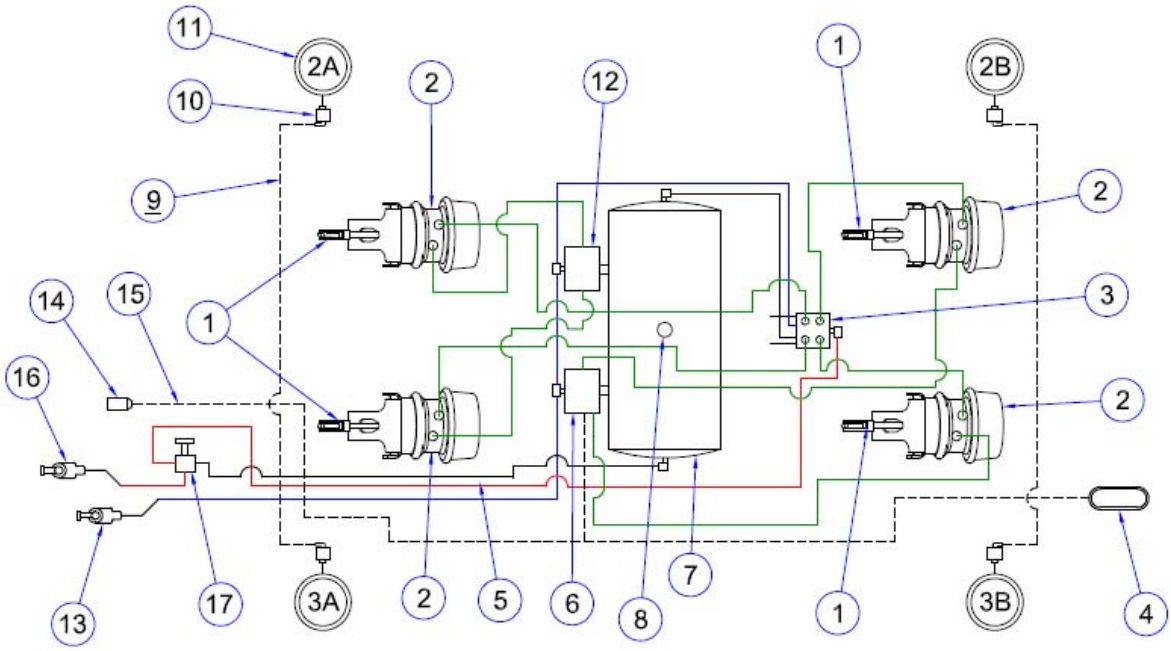
(2) Install the spring brake control (RT4) valve on the trailer.

(3) Reconnect air lines to the spring brake control (RT4) valve as per the tagging and Figure 4-13.

(4) Charge air system.

(5) Check for leaks.

(6) Check operation of brakes.



1	AUTOMATIC SLACK ADJUSTER	**10**	ABS, SENSOR
2	SPRING BRAKE	**11**	ABS TONE RING
3	SPRING BRAKE VALVE, RT4	**12**	ABS VALVE (12 PORT) 24V
4	LIGHT, ABS WARNING	**13**	SERVICE GLADHAND
5	WIRE HARNESS	**14**	CONNECTOR, POWER
6	VALVE, MOD2 ABS W/SLH	**15**	CABLE AY, POWER
7	AIR RESERVOIR	**16**	GLADHAND SUPPLY
8	VALVE, DRAIN	**17**	VALVE, HOSTLER
9	ABS SENSOR CABLE		

Figure 4-13. Air, Control Line, Supply Lines

4-13. BRAKE ADJUSTMENT

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-235-8115

b. Equipment Condition.

Trailer air supply connected to prime mover and charged.
Trailer parking brake released.
Trailer on jack stands.

c. Adjustment.

NOTE

Trailer air supply must be connected to prime mover for proper adjustment of brakes. Support trailer with jack stands.

(1) Rotate the hex extension (1) on the automatic slack adjuster clockwise until the brake linings contact the brake drum (Figure 4-14).

(2) Back off the automatic slack adjuster by rotating the hex extension (1) counterclockwise one half turn. When backing off the automatic slack adjuster, a ratcheting sound will be heard.

(3) Using a ruler, measure and note the distance from the face of the air chamber to the center of the large pin in the clevis (A) (Figure 4-14).

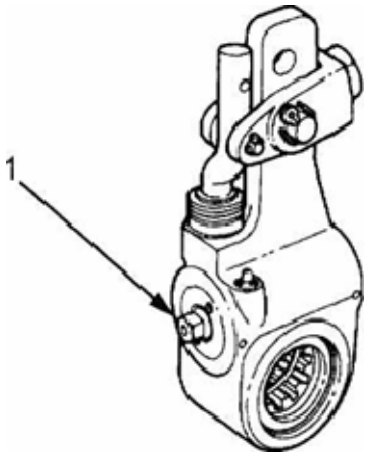


Figure 4-14. Automatic Slack Adjuster

(4) Have an assistant press the brake and hold it, allowing the push rod and slack adjuster to travel its maximum stroke.

(5) While maintaining brake pressure, measure and note the distance from the face of the air chamber to the center of the large pin (B).

(6) The difference between (A) and (B) is the push rod stroke. The push rod stroke should not be greater than 2 inches (Figure 4-15). If the push rod stroke is greater than 2 inches, check the free stroke measurement.

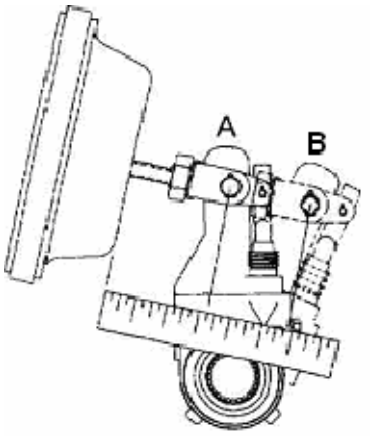


Figure 4-15. Adjusting Automatic Slack Adjuster

NOTE

Free stroke is the amount of movement of the slack arm required to move the brake against the drum.

(a) With the brakes released, measure from the face of the spring brake chamber to the center of the clevis pin (C) (Figure 4-16).

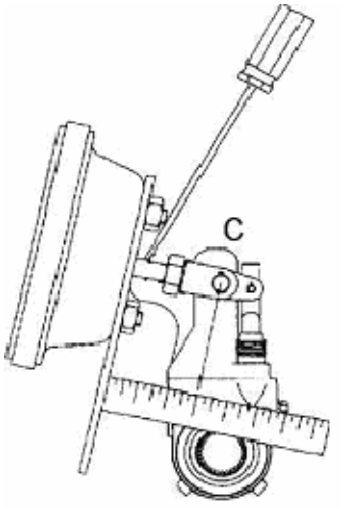


Figure 4-16. Checking Free Stroke Adjustment

(b) Using a lever, move the push rod outward from the spring brake chamber until the brake shoes contact the drum.

(c) When the brake shoes contact the drum, again measure the distance from the face of the spring brake chamber to the center of the clevis pin.

(d) The difference between the released and applied measurements is the free stroke. The free stroke should be between 3/8" and 5/8".

1. If the free stroke is good, but the push rod stroke is too long, there is a problem with the brake components. Check for missing or worn components, cracked brake drums, or improper lining to drum contact.

2. If the free stroke is greater than 5/8", a function test of the automatic slack adjuster should be performed.

3. If the free stroke is less than 3/8", a dragging brake can occur. Check to ensure that the manual adjustment procedures have been completed properly, steps:

(7) Tighten clevis nut to 40-50 ft-lbs of torque against clevis.

(8) Tighten jam nut to 40-50 ft-lbs of torque against clevis nut.

d. Function Check.

NOTE

The automatic slack adjuster should not require manual readjustment. If the maximum chamber stroke is less than 2 inches, the slack adjuster should not be manually readjusted.

If the push rod stroke exceeds 2 inches, measure the free stroke.

If the free stroke is between 3/8" and 5/8", but the push rod stroke exceeds 2 inches, there is a problem with the brake components. Check for missing or worn components, cracked brake drums, or improper lining to drum contact.

If the free stroke is greater than 5/8 ", a function test should be performed in accordance with the following procedures.

Trailer air supply must be connected to prime mover for a function test of the automatic slack adjuster. Support trailer with jack stands.

(1) Using a wrench, rotate the hex extension 3/4 turn clockwise. A ratcheting sound will be heard.

(2) Use chalk to mark a line on the hex extension and automatic slack adjuster (Figure 4-17).

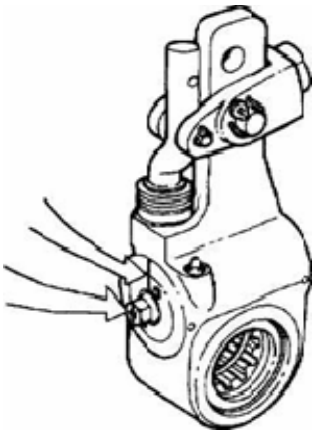


Figure 4-17. Marking Automatic Slack Adjuster for Function Check

(3) Apply the brakes several times and watch for the hex extension to rotate clockwise.

(a) The hex extension will turn in small increments. Several brake applications will be required to observe movement.

(b) If the hex extension does not rotate clockwise, the automatic slack adjuster must be replaced (paragraph 4-9).

(4) Check the torque by attaching a torque wrench to the hex extension and turning it in a counterclockwise direction. If less than 15 ft-lbs of torque is required to rotate the hex extension in the counterclockwise direction, the automatic slack adjuster must be replaced (paragraph 4-9).

(5) If the hex extension rotates clockwise when the brakes are applied (steps (1) to (3) above) and has a torque of greater than 15 ft-lbs when rotated counterclockwise, the automatic slack adjuster is functioning properly. The excessive free stroke (step (4) above) measurement is resulting from worn or broken components.

(a) Check brake system for proper function, worn cam bushings, pins, and rollers, broken springs, worn clevis bushings, and worn clevis pins.

(b) Repair as necessary and repeat function test.

(6) Readjust brakes after function test is performed (paragraph 4-13).

Section V. AIR SUPPLY AND STORAGE SYSTEM

4-14. GLADHAND ASSEMBLY

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-235-8115

b. Equipment Condition.

Air Reservoir empty.

c. Removal.

(1) Tag air line and gladhands.

(2) Unscrew and remove gladhand from air line.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-20, for appropriate part information.

e. Installation.

NOTE

There are two different gladhands, one for the supply air line and one for the control air line. Check Appendix B to ensure that the correct gladhand is installed on each air line.

Apply pipe sealant to threads.

(1) Connect air line to gladhand.

(2) Charge air system.

(3) Check system for leaks.

(4) Check operation of brakes.

4-15. AIR LINES AND FITTINGS

Air lines and air line fittings are not ordinarily removed except for replacement. Badly damaged lines and fittings must be replaced. Lines must be kept tightly attached and connected. See air system schematic (Figure 4-13)

a. Tools Required.

Pipe sealant
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-235-8115

b. Equipment Condition.

Air lines purged.

c. Repair.

NOTE

Air line tubing can either be replaced or repaired depending on the length of damaged section. If the damaged air hose is short, replace it. If the damaged air hose is long, repair it.

Air lines and air line fittings are not ordinarily removed except for replacement. Badly damaged lines and fittings must be replaced. Lines must be kept tightly attached and connected. See air system schematic (Figure 4-20).

4-16. AIR RESERVOIR

Pipe sealant
Tags
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-235-8115

a. Equipment Condition.

Air reservoir drained.

b. Removal.

(1) Tag and disconnect air lines from air reservoir.

(2) Remove the ABS relay valves from the air reservoir.

(3) Unbolt and remove air reservoir from the trailer.

c. Repair. Repair is limited to replacement of hardware. See Appendix B, Figures B-20 for appropriate part information.

d. Installation. (Figure 4-18)

NOTE

Apply pipe sealant to threads to prevent air leaks at the fittings.

Install these fittings into air reservoir before installing air reservoir. There are two elbow connectors on the end ports of the air reservoir, each is the same type. There is one drain petcock in bottom port of air reservoir. There is one square head plug-in port on backside of air reservoir. There are two ports on front side of air reservoir and each port uses one Hex Reducer Bushing with one pipe nipple.

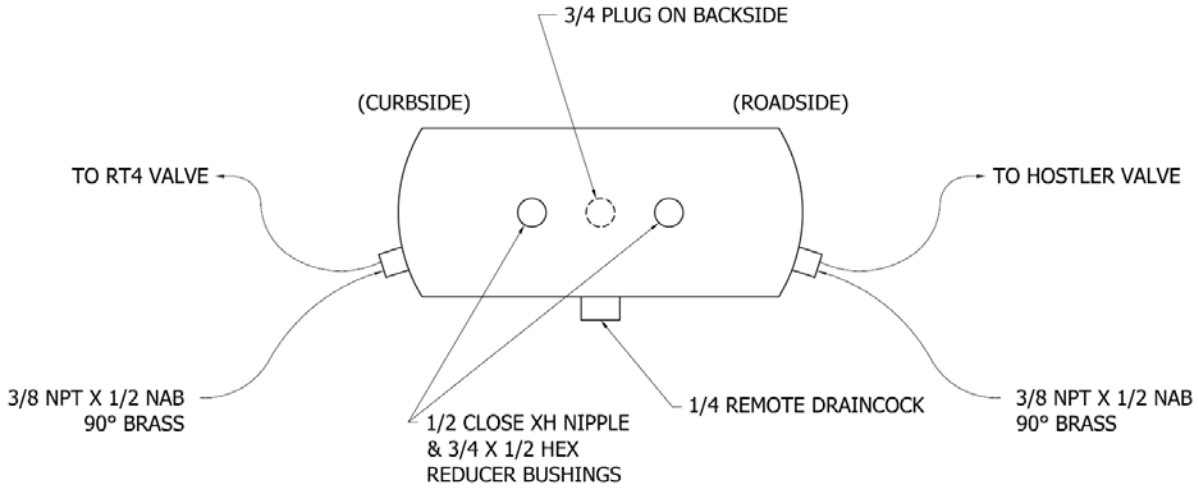


Figure 4-18. Air Reservoir

(1) Install and bolt air reservoir to the trailer.

(2) Install the ABS relay valves on the air reservoir.

(3) Connect air lines as per the tagging and Figure B-20.

(4) Charge the air system.

(5) Check for leaks.

(6) Check operation of brakes.

4-17. AIR RESERVOIR REMOTE PETCOCK VALVE

a. Tools Required.

Pipe sealant
Tags
Tool Kit, Mechanics General, NSN 5180-00-606-3566

b. Equipment Condition

Air reservoir drained

c. Removal.

(1) Remove lanyard from petcock valve.

(2) Remove valve.

d. Repair. Repair is limited to replacement of hardware. See Appendix B. Figure B-20, for appropriate part information.

NOTE

Apply pipe sealant to threads.

e. Installation.

(1) Apply pipe sealant on threads of valve.

(2) Screw into air reservoir.

(3) Connect lanyard to valve.

(4) Pressurize system, check for air leaks and proper operation.

Section VI. AXLES

4-18. AXLE ALIGNMENT

a. Tools Required.

Oxyacetylene cutting torch/welder
7018 low hydrogen rod or equivalent
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-235-8115

b. Equipment Condition.

Located on level firm ground.
Trailer coupled or uncoupled to prime mover.
Tires chocked.
Wheel/Tire assembly removed.

c. Removal.

(1) Use the Oxyacetylene torch to cut off the anti-turn washer surrounding the head of the bolt (1) (Figure 4-19). Discard the washer, a new one is required to be installed.

(2) Remove the nut on the inboard side of the suspension beam.

Figure 4-19. Suspension

(3) Remove the eccentric/alignment bolt with the arrow at the 12 o'clock position on the coiled end of the spring pack.

d. Alignment.

(1) Measure distance between axle tubes roadside versus curbside. Measure to the farthest point possible at the end of the axle tubes. This is the point just inside of brake drums.

(2) Note the driver side measurement between axles and compare to roadside measurement between axles.

(3) Driver side and passenger side measurements should vary no more than 1/16 of an inch.

(4) If curbside and roadside measurements vary more than 1/16 of an inch, rotate eccentric alignment bolt in direction as is to be moved until dimensions are within tolerance. Maximum movement from the 12 o'clock position is 9 or 3 o'clock, forwards and rearwards.

e. Installation.

CAUTION

Ensure eccentric/alignment bolt does not turn and change alignment during nut torque.

(1) Once alignment is achieved, install and torque eccentric/alignment bolt to 1,000 ft./lbs.

(2) Install anti-turn washer by welding two 3/16" fillet welds approximately 3/4" to 1/2" in length. Welds should be 180 degrees opposite each other.

NOTE

Semi-annually retighten to the specified torque.

CHAPTER 5
INTERMEDIATE LEVEL OF MAINTENANCE OF ELECTRICAL SYSTEM COMPONENTS

Section I. INTRODUCTION

5-1. GENERAL

This chapter will address the Intermediate LOM actions associated with the trailer's electrical system.

Section II. TROUBLESHOOTING

5-2. TROUBLESHOOTING PROCEDURES

Troubleshooting guidelines are provided as an aide in locating and correcting problems that occur during operation of the trailer. Check operator troubleshooting procedures prior to performing the procedures listed in Table 5-1. Perform the inspection procedures in the order listed for a particular item.

Table 5-1. Electrical Maintenance Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
LIGHTS		
All lights inoperable.	Check prime mover to ensure lights are on.	Turn lights on. If lights still inoperable, notify maintenance.
	Check prime mover electrical connection at cable receptacle.	Reconnect cable if not properly connected.
	Check electrical connection for dirty, corroded, or damaged pins.	Clean connection. If damaged, repair in accordance with paragraph 5-6.
One or more lights inoperable.	Check for burned out or defective LEDs.	If prime mover has no power, consult appropriate TM for troubleshooting.

Table 5-1. Electrical Maintenance Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
	Unplug wires at receptacle and check for proper voltage, Figure 5-1.	If proper voltage exists, replace receptacle in accordance with paragraph 5-4 or 5-5. If proper voltage exists, check for breaks or damage to wires between test points. Repair or replace wiring in accordance with paragraph 5-6. Repair or replace wires as required in accordance with paragraph 5-7.

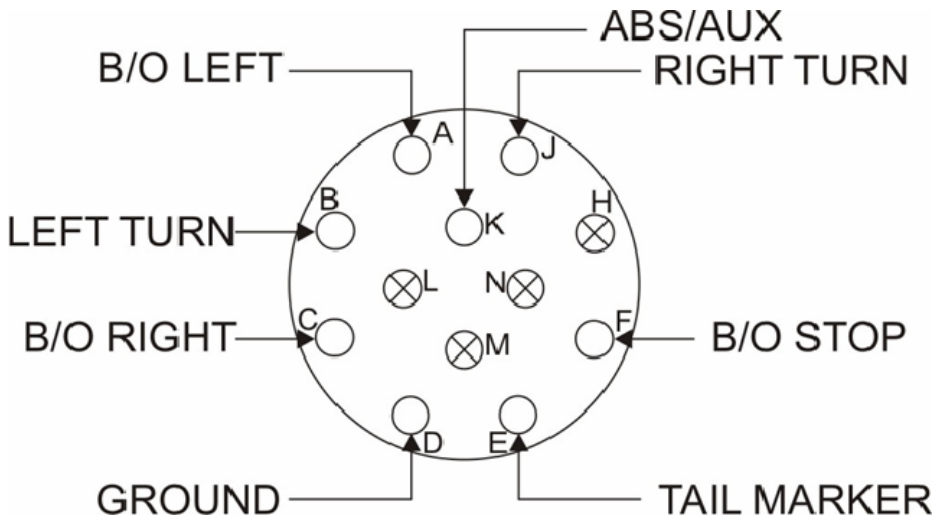


Figure 5-1. Prime Mover Cable Connection

5-3. ABS TROUBLESHOOTING PROCEDURES

Intermediate LOM troubleshooting of the ABS system can be preformed either using an Info Center Hand Held ABS Diagnostic Tool or can be conducted manually using the ABS warning light. The Info Center provides a more thorough diagnostic but the unit may not be available when needed. Table 5-2 lists the ABS Troubleshooting procedures if the Info Center device is not available and table 5-3 lists the procedure if the Info Center is available. The Intermediate LOM troubleshooter must choose the correct table based on available resources.

Table 5-2. ABS Warning Light Troubleshooting Procedures

ABS WARNING LIGHT DIAGNOSTIC PROCEDURES
PRELIMINARY PROCEDURES BEFORE TROUBLESHOOTING 1. Power is required at stop light circuit. 2. A volt/ohm meter is needed for some of the troubleshooting procedures without the Info Center. **CAUTION** **Do not use a battery charger to power the ABS.** **CAUTION** **Before disconnecting anything remove electrical power and air pressure from the system.**

Table 5-2. ABS Warning Light Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
ABS warning light illuminates for 3 seconds when power is applied.	Normal operating indication	None

Table 5-2. ABS Warning Light Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
The valve blow down is an audio check of the solenoids (located on the top of the relay valve).	Listen for solenoid to be energized.	None
If the ABS is powered up when traveling 6 mph the ABS warning light will remain off unless there is a fault.	None	None
ABS warning light stays on permanently	Verify the voltage at the inter-vehicle cable J pin (Figure 5-1) is 24 – 28 volts and that a valve blow down occurs when powering the ABS. If there is no blow down, then verify that air pressure was applied at the service brakes. Note: If there is no air in the system, each valve will "click" on power-up. If air is in the system, each valve will exhaust a short blast of air at power-up. If resistance is good, then check the female connectors in the connector for excessive spread or corrosion. If there is a valve blow down, then the sensor is the most likely issue.	Compress the female connectors. Push the sensor in until it touches the exciter. Remove electrical power, then re-power and drive trailer above 6 mph. Light should remain off.

Table 5-2. ABS Warning Light Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
	If there is air pressure to the service brakes, then disconnect the solenoid connector and check resistance at the solenoid pins, Figure 5-5. Readings across the two bottom pins should be 32 +/- 4 ohms. Readings between both bottom pin and the top pin should be 16 ohms.	Replace ABS relay value, see paragraph 4-10.
	Disconnect the sensor connectors from the sensors and measure the resistance between the two pins in the sensor connector housing, Figure 5-6. The reading for each sensor should be between 980 – 2350 ohms. Check for top pin spread and/or corrosion.	Replace sensor if a problem or fault is found, see Appendix B, Figure B-20.
	Measure the AC voltage at each sensor while rotating the wheel at a rate of 1 revolution every two seconds. This reading should average .200 volts.	Replace faulty sensor, see Appendix B, Figure B-20.
	If the problem persists, disconnect the ECU connector. Check for bent pins or corrosion.	Repair and retest.
	Use a volt/ohm meter to test continuity between pins in valve connector and ABS ECU connector, see Figure 5-3, for assignments.	Replace harness or ECU if corroded, see Appendix B, Figure B-20.

Table 5-2. ABS Warning Light Troubleshooting Procedures

MALFUNCTION	INSPECTION	CORRECTIVE ACTION
No ABS warning light illumination.	Check the lamp to verify that it is functional.	Replace lamp if necessary, see paragraph 5-5.
	Verify that there is adequate power. There should be 24-28 volts for test purposes.	
	Verify that there is power to the ECU.	
	Be sure to listen for 2 clicks when reconnecting the main wire harness to the ECU and secure the connection with the attached metal latch, Figure 5-9.	
	Disconnect the main wire harness 28 pin connector at the ECU and check for B+ (positive power) at either pin 5 or pin 6, Figure 5-3. The voltage drop between trailer power connector and the ECU should not exceed 4 volts.	If there is no power then the prime mover wiring or the inter-vehicle cable needs repair.
	Check inter-vehicle cable connector for excessive pin spread and/or corrosion.	Clean, repair and test.
	If the problem remains, disconnect the ABS ECU connector. Check for bent pins.	Repair and test
ABS warning light comes on when powered up, goes off above ~6 mph, but the wheels lock up.		This is not ABS related. Refer to Table 4-1 for brake troubleshooting.

Table 5-3. ABS Info Center Troubleshooting Procedures

INFO CENTER DIAGNOSTIC FAULT CODES
PRELIMINARY PROCEDURES BEFORE TROUBLESHOOTING The Info Center (INFO CENTRE) is a diagnostic tool used for readout of fault codes available in the ABS ECU. To put the Info Center into operation: 1. Connect it to the ABS diagnostic connector. While the ABS is powered, information is transferred to the Info Center. 2. Press the right function button only. Some functions require a two second button hold. 3. If a “COMFAIL” message appears on the Info Center check the ABS diagnostic connection and press the right function button again. Verify there is 10 volts on trailer side pins 1-4, see Figure 5-6. 4. When power is applied to the ABS, the Info Center displays: a. A display test, Figure 5-2. b. ABS sensor/valve configuration (example - 4S2C C2 = (4 sensors/2 valves) c. Highest numerical fault code. 5. Press the right function button and use the following codes and corrective actions to conduct the ABS diagnostic checks.

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
Code 00, 07, 8.8, A5, AS, or C2.	Indicates that the system is working OK.	"00" with the trailer moving or "07" with the trailer not moving indicate that there are no active faults. "A5" are configuration codes and may or may not be present. Ignore these. "8.8" is a self-diagnostic test. "C2" indicates that the ABS is a 4S/2M system.

Table 5-3. ABS Info Center Troubleshooting Procedures

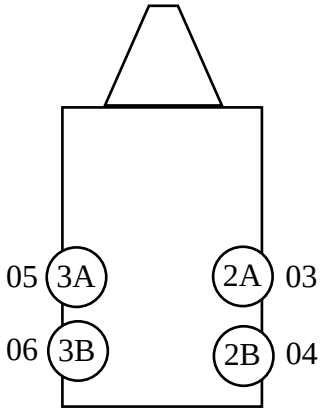
Malfunction	Inspection	Corrective action
Code 03, 04, 05, or 06. Wheel speed sensor or its wiring has a short or open circuit.  	Disconnect the relevant sensor connector from the sensor and measure the resistance between the two pins in the sensor connector housing. The ohm meter reading for the sensor should be between -980 and 2350 ohms. The main wire harness 28 pin connector can be disconnected at the ECU, Figure 5-3, to check for open or shorts in the sensor cables. Sensor cable pins are # 1, 2, 10, 11, 12, 20, 21 and 22. Check for opens and shorts between the connector and its related cable end. Also check for damaged harness pins. Be sure to listen for 2 clicks of the latches snapping into place when reconnecting the main wire harness to the ECU, Figure 5-9. Secure the connection with the attached metal latch.	Replace any defective hardware and retest, see Appendix B, Figure B-20. Replace sensor. Repair shorts or damaged harness pins.
Code 13, 14, 15, or 16. The output of a wheel speed sensor of a moving trailer is insufficient.	The most likely reason for this is the gap between one sensor and the exciter is too great. Measure the AC voltage at the sensor in question while rotating the	If this is not the case, try pushing in the sensor until it touches the exciter (tone ring). If this doesn't correct the problem then replace the sensor.

Table 5-3. ABS Info Center Troubleshooting Procedures

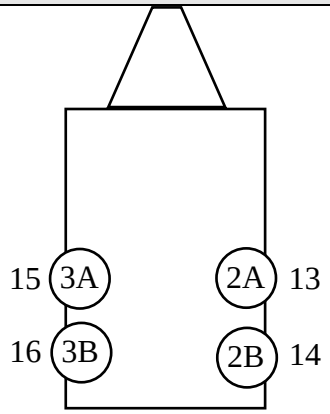
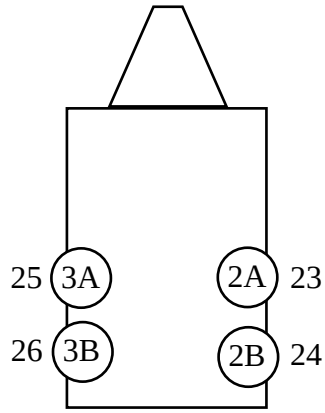
Malfunction	Inspection	Corrective action
	wheel at a rate of 1 revolution every two seconds. The output should be at least 200 millivolts.	If the gap on both sensors is too great, you may not get a fault. If the ECU isn't getting any voltage from either sensor it will assume that the trailer is not moving, even when it is. If you suspect this is the case, check each wheel separately for output.
Code 23, 24, 25, or 26. There is an intermittent loss of a sensor signal when the trailer is traveling down the road. 	Inspect components at the affected wheel for: Broken sensor retaining clip. A damaged exciter (tone ring). Check for excessive wheel bearing end play. Other possible causes are:	 Replace any defective components and retest, see Appendix B, Figure B-20. Replace any defective components and retest, see paragraph 4-3. Replace any defective components and retest, see paragraph 4-4.

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
	A loose, damaged, or corroded sensor electrical connection.	Replace any defective components and retest, see paragraph 5-7.
	A break in the cable.	Replace any defective components and retest, see paragraph 5-7.
	External damage to the cable.	Replace any defective components and retest, see paragraph 5-7.
Code 42 or 43. A wheel is slow to come back up to speed when ABS releases the brakes during an ABS event.	The most likely causes include a dragging brake, a pinched or kinked delivery hose, or defective modulator valve.	
	Check the brakes to ensure that they release completely.	Refer to the brake adjustment procedure, paragraph 4-13.
	Look for visual external damage to the delivery hoses or delivery tubing.	Refer to the air lines and fittings procedure, paragraph 4-15.
Code 62, 63, 68, or 69. A solenoid or its cable has an open circuit internally.	The most likely causes include a bad solenoid or a loose solenoid connection.	
	Disconnect the solenoid connector, Figure 5-5, and check the resistance at the solenoid pins. Readings across the 2 bottom pins should be 30 - 34 ohms. Readings between both	Replace defective hardware as required and retest, see Appendix B, Figure B-20.

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
	bottom pin and the top pin should be 15 - 17 ohms. Also check the female terminals on the connector for excessive pin spread or corrosion also.	
	Check for a bad solenoid cable, the main wire harness 28 pin connector not completely latched into the ECU, or a damaged harness pin.	Repair as required and retest, see Appendix B, Figure B-20.
	Remove the harness from the ECU and check for continuity between pins 3, 4, 13, 14, 23 and 24, Figure 5-2, and their related terminals on the cable end.	Repair as required and retest, see paragraph 5-7.
	Be sure to listen for 2 clicks of the latches snapping into place when reconnecting the main wire harness to the ECU, Figure 5-9.	
Code 72, 73, 78, or 79. A solenoid or its cable has a short circuit to ground (Negative).	The most likely causes include: a damaged cable or solenoid. An example of this is a worn or chafed cable that has exposed wires contacting the trailer.	
	Disconnect the solenoid connector and check for continuity between each solenoid terminal and trailer ground. Next remove the main wire harness 28 pin connector, Figure 5-3, and check for continuity between	Replace defective wiring harness and retest, see paragraph 5-7.

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
	pins 3, 4, 13, 14, 23 and 24 and trailer ground. If the resistance is less than 10 m ohms in any case. If the code still exists then the ECU is likely defective. Be sure to listen for 2 clicks of the latches snapping into place when reconnecting the main wire harness to the ECU, Figure 5-9.	
Code 82, 83, 88, or 89. The solenoid or its cable has a short circuit to B+ positive 24 volts.	The most likely cause is a damaged cable or solenoid. Remove the harness from the ECU and test, with power disconnected (Figure 5-3), for continuity between pins 3, 4, 13, 14, 23 and 24 and trailer B+. If the code still exists then the ECU is likely defective. Be sure to listen for 2 clicks of the latches snapping into place when reconnecting the main wire harness to the ECU, Figure 5-9.	Replace defective hardware and retest, see paragraph 5-7.
Code 90. ABS voltage is below 16 volts.	This fault will disappear when the voltage exceeds 16 volts, without the ignition being recycled. This fault is NOT stored in the ECU history. Check the voltage drop	

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
	between the inter-vehicle cable J-pin and the ABS ECU. The voltage drop should not exceed 4 volts. Check for damaged or corroded wire, terminal, or splice in the ABS power supply circuit	Replace wiring harness, see paragraph 5-7.
Code 92. Indicates that the ABS voltage is above ~22 volts.	The most likely cause is a malfunctioning voltage regulator or tester power supply set too high.	Check power from prime mover.
Code 80, 93, 99, E0 - E9. Indicates that the ECU is likely defective.	No check.	Replace the ECU and retest to confirm problem is resolved, see paragraph 5-8.
Code CA, CC.	A "CA" code will "Clear All" faults stored in history. A "CC" code will be displayed during the third consecutive time that a "Clear All" is attempted.	Clear codes. Note that dynamic faults will not be erased from memory until the trailer is driven above ~6 mph. This will "Clear Configuration" and should be avoided. If a "CC" is displayed, power down the system and power back up.
Code HI, LO, or Blank Diagnostic Screen.	For either "HI" or "LO" faults, check supply voltage. Be sure to listen for 2 clicks of the latches snapping into	If the voltage is between 24 and 28 VDC (Voltage Direct Current), then disconnect the main wire harness 28 pin connector, Figure 5-2, and check

Table 5-3. ABS Info Center Troubleshooting Procedures

Malfunction	Inspection	Corrective action
	place when reconnecting the main wire harness to the ECU, Figure 5-9.	individual diagnostic wires for opens or shorts. Pins 7 and 18, on the main wire harness 28 pin connector, power the diagnostics. Pins 8 and 19 are the communication lines.
	An open or short in the power wires of the diagnostics.	Replace wiring harness, see paragraph 5-7.
	No power at the inter-vehicle cable J-pin.	Restore primary power source and restart test.

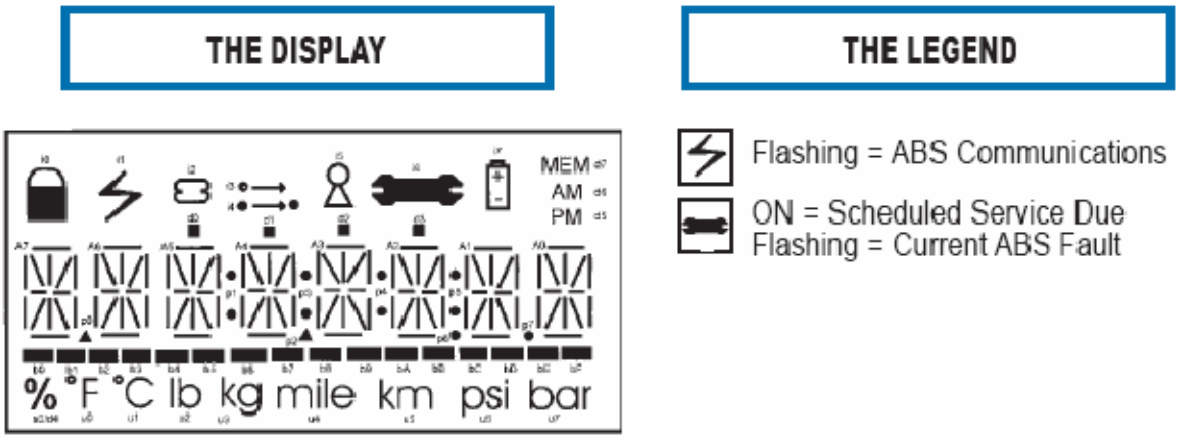


Figure 5-2. Info Center Display Test and Legend

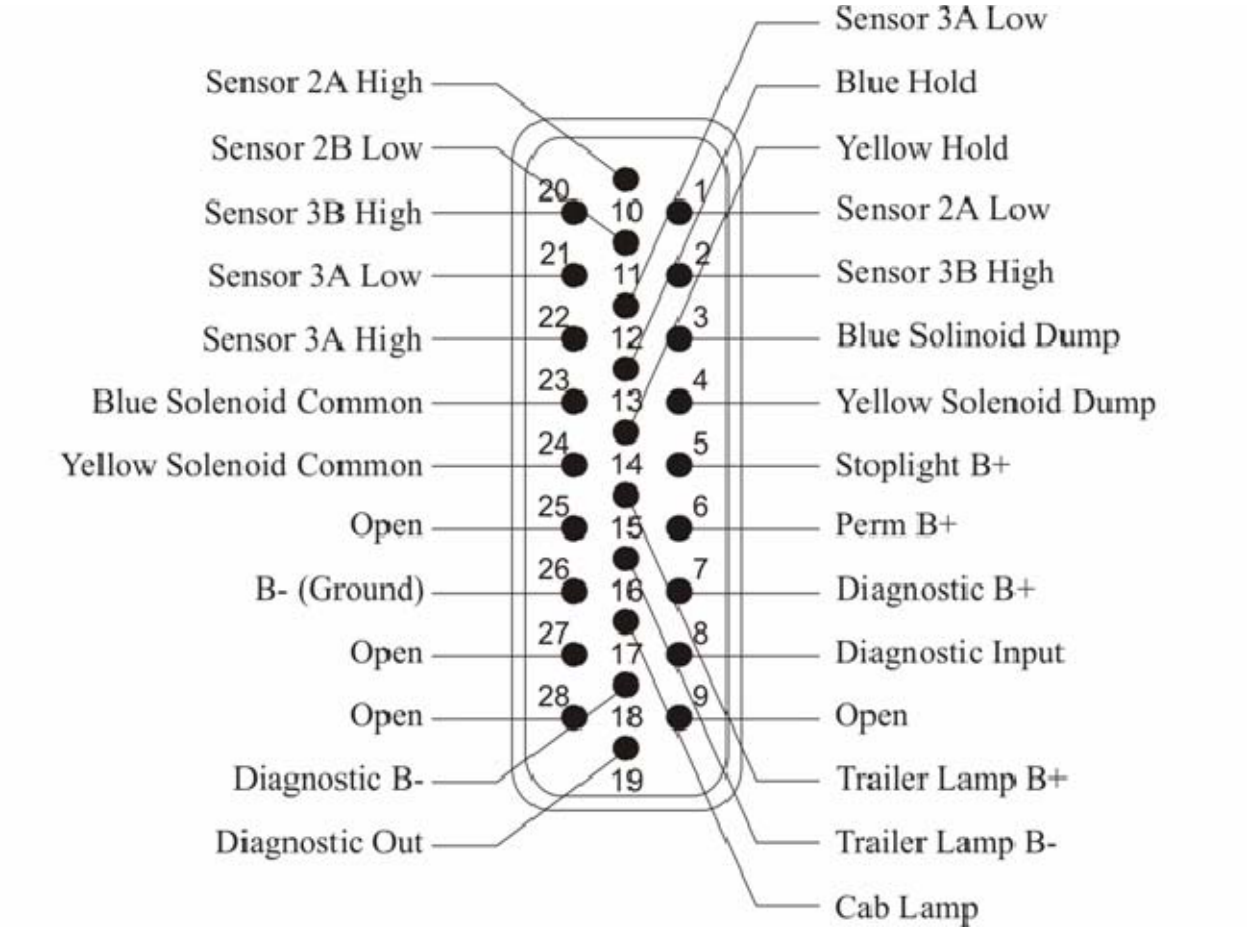


Figure 5-3. ECU Connector

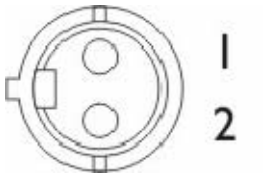


Figure 5-4. ABS Sensor Plug

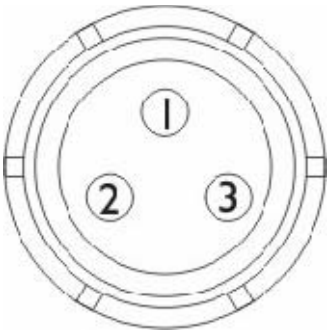


Figure 5-5. ABS Solenoid Valve Plug

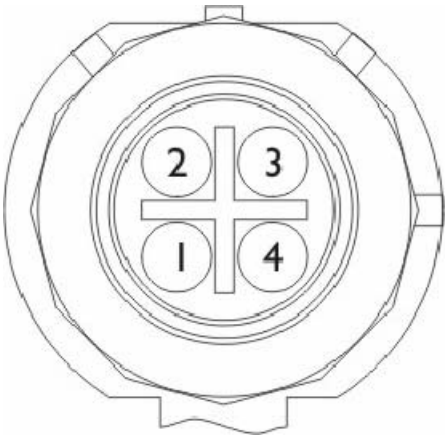


Figure 5-6. ABS Diagnostic Plug

Section III. LIGHTS

5-4. COMBINATION BLACKOUT AND LED TAIL LIGHTS

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No l, NSN 4910-01-238-8115
Tags

b. Equipment Condition.

24 volt receptacle disconnected from prime mover.
No electrical power to the trailer.

c. Removal.

WARNING

REMOVE ALL POWER TO TRAILER PRIOR TO REMOVING THE LIGHTS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

(1) Tag and disconnect connectors.

(2) Remove screws, Figure 5-7.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-24, for appropriate part information.

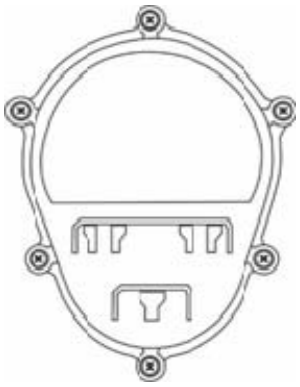


Figure 5-7. Blackout/LED Tail Light

e. Installation.

(1) Install blackout light assembly and gasket on frame and secure with six screws.

5-5. LED SIDE LIGHTS (CLEARANCE LIGHTS)

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115

b. Equipment Condition.

24 volt receptacle disconnected from prime mover.
No electrical power to the trailer.

c. Removal.

WARNING

REMOVE ALL POWER TO TRAILER PRIOR TO REMOVING THE LED SIDE CLEARANCE LIGHTS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

(1) Remove screws from lens housing (Figure 5-8).

(2) Remove lens housing and lens.

(3) Rotate 90 degrees counterclockwise and remove.

(4) Unplug LED from wire.

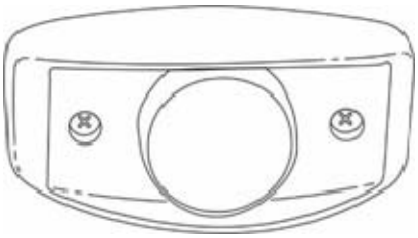


Figure 5-8. Clearance Light

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-24, for appropriate part information.

e. Installation.

(1) Plug wire into LED lamp.

(2) Insert and rotate 90 degrees clockwise to lock in place.

(3) Install two screws to secure lens housing (Figure 5-8).

5-6. INTER VEHICULAR ELECTRICAL CABLE (IVEC) (24 VOLT RECEPTACLE) (ELECTRICAL CONNECTOR)

a. Tools Required.

Solder
Soldering gun
Tags
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Petroleum jelly

b. Equipment Condition.

24 volt receptacle removed.
No power to the trailer.

c. Disassembly.

WARNING

REMOVE ALL POWER TO TRAILER PRIOR TO MAKING ANY REPAIRS ON THE ELECTRICAL SYSTEM. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

(1) Remove clamp.

(2) Unplug cable from connector housing.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-20, for appropriate part information.

e. Installation.

(1) Plug wire into new connector housing.

(2) Tighten clamp on receptacle assembly.

5-7. WIRING HARNESS

a. Tools Required.

Plastic Ties
Tool Kit, Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Wire Tags

b. Equipment Condition.

24 volt receptacle disconnected from prime mover.
No electrical power to the trailer.

c. Removal.

WARNING

REMOVE ALL POWER TO TRAILER PRIOR TO MAKING ANY REPAIRS ON THE WIRING HARNESS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

(1) Tag and remove wires from wiring harness.

(2) Cut the plastic ties and open wire loom clamps that retain wiring harness section, as required.

(3) Remove wiring harness section from trailer.

d. Repair. Complete wiring harness sections may be replaced. See Appendix B, Figure B-23, for appropriate part information.

e. Installation.

(1) Install new wiring harness section onto the trailer; refer to Figure B-23.

(2) Install plastic ties and close wire loom clamps that retain wiring harness section, as required.

5-8. ABS ELECTRONIC CONTROL UNIT

a. Tools Required.

Tool Kit Mechanics General, NSN 5180-00-606-3566
Tool Set, Common Set No. 1, NSN 4910-01-238-8115
Dielectric Grease

b. Equipment Condition.

Wheels chocked

c. Removal.

(1) Remove ECU cable, Figure 5-9.

(2) Remove screws on ECU.

(3) Slide ECU off of ABS relay valve.

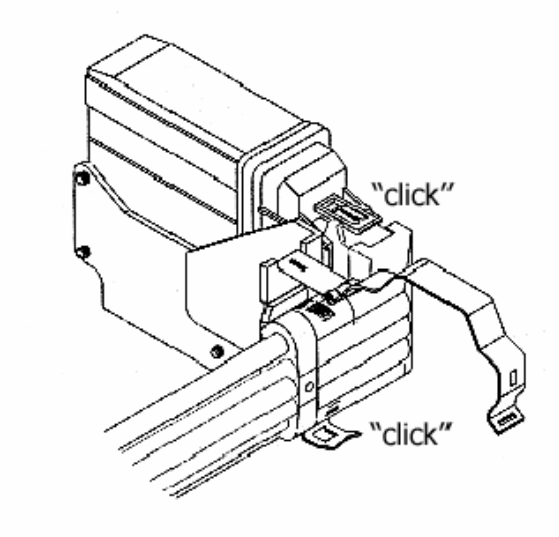


Figure 5-9. ECU Cable Connection

d. Repair.

(1) Repair is limited to replacement of damaged parts identified from the inspection. See Appendix B, Figure B-20, for appropriate part information.

e. Installation.

(1) Put dielectric grease on ground tab.

(2) Slide ECU onto ABS relay valve.

(3) Align and install 3 screws on ECU.

(4) Plug 28-pin plug into ECU and listen for 2 clicks, Figure 5-9.

CHAPTER 6
INTERMEDIATE LEVEL OF MAINTENANCE OF ACCESSORIES

Section I. INTRODUCTION

6-1. GENERAL

This chapter will address the Intermediate maintenance actions associated with the trailer's accessories, to include data plates, toolboxes and mud flaps.

Section II. ACCESSORIES

6-2. DATA PLATE

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Drill
Rivets

b. Equipment Condition.

Brakes set.
Wheels chocked.

c. Removal.

(1) Drill out rivets from data plate.

(2) Remove data plate.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-6, for appropriate part information.

e. Installation.

(1) Using a stamp kit, stamp correct data into new data plate.

(2) Place data plate in position.

(3) Install data plate with rivets.

6-3. DRAWBAR / BEAVERTAIL TOOLBOX DOOR

a. Tools Required.

Tool Kit, Mechanics General, NSN 5180-00-606-3566
Grinder
Welder

b. Equipment Condition.

Brakes set (locked) and wheels chocked.

c. Removal.

NOTE

CARC paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) Remove spare tire.

(2) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

(3) Using a cutting torch, remove the hinges from frame, Figure 6-1.

(4) Remove toolbox door.

(5) Remove hinge tubes, if required,

d. Repair.

(1) Toolbox door may be repaired or replaced.

(2) See Appendix B, Figure B-10, for appropriate part information.

Figure 6-1. Drawbar Toolbox Door (Open)

e. Installation.

CAUTION

Extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. Welding procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with appropriate AWS and local welding procedures.

(1) If removed, position hinge tubes on trailer.

(2) In accordance with welding procedures, weld hinge tubes to trailer.

(3) Position toolbox door on trailer.

(4) Insert hinge pins through toolbox door hinge and hinge tube.

(5) Weld hinge pin to hinge tube on trailer to hold pin in place.

(6) Check for proper operation of toolbox door.

6-4. BEAVERTAIL TOOLBOX DOOR

a. Tools Required.

Welder
Tool Kit, Mechanics General, NSN 5180-00-606-3566

b. Equipment Condition.

Brakes set (locked) and wheels chocked.

c. Removal.

NOTE

CARC paint debris is considered environmentally hazardous during removal. Consult local procedures prior to removal of CARC paint to ensure compliance with local laws.

(1) In accordance with local procedures for CARC paint, remove paint from area to be repaired.

(2) Mark location above and beside hinge tube on trailer to aid in location of new hinge tube, if required.

(3) Remove weld on end of hinge tubes on trailer (Figure 6-2).

(4) Drive pin out of toolbox door hinge and hinge tube.

(5) Remove toolbox door.

(6) Remove hinge tubes, if required,

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-10, for appropriate part information.

Figure 6-2. Beavertail Toolbox (Open)

CAUTION

Extreme care must be exercised when cutting, grinding, and/or welding on metal surfaces. Excessive heat from these processes may cause damage to and reduction of strength in areas that are worked on. Welding procedures should only be performed by or under the supervision of trained personnel.

NOTE

All welding shall be performed in accordance with appropriate AWS and local welding procedures.

e. Installation.

(1) If removed, position hinge tubes on trailer.

(2) In accordance with welding procedures, weld hinge tubes to trailer.

(3) Position toolbox door on trailer.

(4) Insert hinge pins through toolbox door hinge and hinge tube.

(5) Weld hinge pin to hinge tube on trailer to hold pin in place.

(6) Check for proper operation of toolbox door.

6-5. MUD FLAP

a. Tools Required.

Wrench

b. Equipment Condition.

Brakes set (locked) and wheels chocked.

c. Removal.

(1) Remove four nuts from bolts, behind retaining bar.

(2) Remove retaining bar.

(3) Remove washers and bolts from mounting bracket and remove splash guard.

d. Repair. Repair is limited to replacement of hardware. See Appendix B, Figure B-12, for appropriate part information.

e. Installation.

(1) Install washers and bolts from mounting bracket and remove splash guard.

(2) Install retaining bar.

(3) Install nuts from bolts behind retaining bar.

APPENDIX A
COMPONENTS LIST

A-1. STOCK LIST-3 (SL-3)

a. General. This section lists Stock List-3 (SL-3) Items for the MTO20A1 EET. These are the minimum essential items required to operate the MTO20A1 EET and to perform emergency repairs. SL-3 Items must accompany the vehicle during operation and whenever the trailer is transferred between property accounts.

b. Explanation of Columns. The following gives an explanation of columns found in the tabular listings:

(1) Item. Indicates the number of the illustration of the item shown.

(2) National Stock Number (NSN). Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

(3) Description. Indicates the item name and, if required, a minimum description to identify and locate the item.

(4) Unit of Issue (U/I). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by an abbreviation (e.g., EA=Each, IN=Inch, PR=Pair).

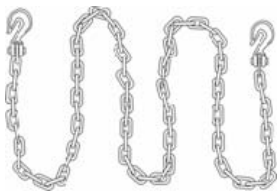
(5) Quantity (Qty). Indicates the quantity of the item authorized to be used with or on the equipment.

Table A-1. Stock List-3 (SL-3)

Item	National Stock Number	Description	U/I	Qty
1		TRANSPORT CHAINS, 3/8” P-70 X 120” W/ GRABHOOK EA. END	EA	5
2	5340015282380	LOAD BINDER, RATCHET	EA	5
3		CHOCK BLOCKS W/ LANYARD	PR	1
4		DAVIT POLE ASSEMBLY, COMPLETE W/ WINCH AND STRAP	EA	1
5		TIRE, VEHICLE	EA	1
6		WHEEL, COMPLETE	EA	1
7		VALVE STEM ASSEMBLY	EA	1

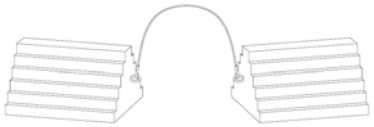
Figure A-1. Stock List-3 (SL-3)

1.

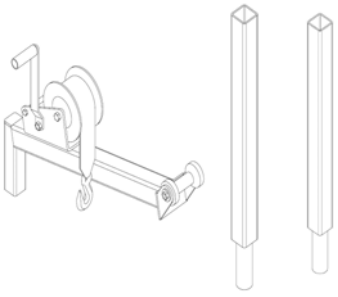


2.

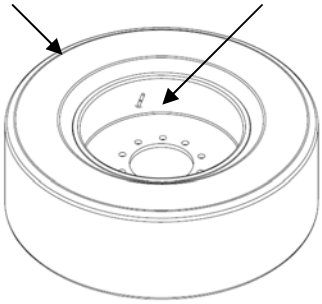
3.



4.



5. **6.**



7.

A-2. ADDITIONAL AUTHORIZATION LIST (AAL)

a. General. This section lists additional items authorized for support for the MTO20A1 EET. These items do not have to accompany the trailer and do not have to be turned in with the end item during maintenance or disposal of the end item.

b. Explanation of Columns. The following gives an explanation of columns found in the tabular listings:

(1) Item. Indicates the number of the illustration of the item shown.

(2) National Stock Number (NSN). Indicates the NSN assigned to the item and will be used for requisitioning purposes.

(3) Description. Indicates the item name and, if required, a minimum description to identify and locate the item.

(4) Unit of Issue (U/I). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by an abbreviation (e.g., EA=Each, IN=Inch, PR=Pair).

(5) Quantity (Qty). Indicates the quantity of the item authorized to be used with or on the equipment.

Table A-2. Additional Authorization List

Item	National Stock Number	Description	U/I	Qty
1		RESTRAINT RATCHET LOAD BINDER	EA	AR
2		RESTRAINT CHAIN	EA	AR

A-3. SPECIAL TOOLS

a. General. This section lists special tools that are not part of the Common or General Mechanics tool sets. These tools must be purchased and maintained separately. Items requiring replacement are the responsibility of the using unit and will be requisitioned through the supply system.

Table A-3. Special Tools

Item	National Stock Number	Description Cage Code and Part Number	U/I	Qty
1	5120013999795	Torx drive, 40 #1	EA	1
2	5895015159443	Info Center, Diagnostics Tool	EA	1

APPENDIX B
REPAIR PARTS LIST

B-1. GENERAL

This section lists authorized spares and repair parts required for the performance of Organizational and Intermediate maintenance of the MTO20A1 trailer in accordance to Marine Corps Order (MCO) 4400.120. It authorizes the requisitioning, issue, and disposition of spares and repair parts as indicated by the Source, Maintenance, and Recoverability (SMR) codes.

B-2. EXPLANATION OF COLUMNS

a. Item Number. Indicates the number of the item called out in the Figure.

b. SMR Code. The SMR code is a 6- position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in Figure B-1.

(1) Source Code (1st two positions). The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Source codes are always the first two positions of the SMR code.

(2) Maintenance Code (3rd and 4th positions). Maintenance codes tell you the category(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

(a) The maintenance code entered in the third position indicates the lowest maintenance category authorized to remove, replace, and use an item.

(b) The maintenance code entered in the fourth position shows whether or not the item is to be repaired and identifies the lowest maintenance category with the capability to do complete repair (i.e., perform all authorized repair functions).

(3) Recoverability Code (5th position). Recoverability codes are assigned to indicate the disposition action of unserviceable items.

(4) Service Option Code (6th position). This maintenance code is assigned to support items to convey specific information to the services' logistics community / operating forces.

c. Cage Code. The Cage Code is a 5-digit number, which is used to identify the manufacturer, distributor, Government agency, etc. that supplies the item.

d. National Stock Number (NSN). Indicates the NSN assigned to the item and will be used for requisitioning purposes.

e. Part Number. Indicates the primary number used by the manufacturer, distributor, Government agency, etc. which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items. (Note: When you use an NSN to requisition an item, the item you receive may have a different part number from the part number ordered. Use or furnish this item as the replacement part.)

f. Description. This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) Items that are included in kits and sets are listed below the name of the kit or set.

(3) Spare/repair parts that make up an assembled item are listed immediately following the assembled item entry.

(4) NSN for bulk materials are referenced in the description column in the line entry for the item to be manufactured/fabricated.

g. Unit of Issue (U/I). Indicates the measure used in ordering the item, expressed by an abbreviation (e.g., EA=Each, IN=Inch, PR=Pair, KIT=Kit).

h. Quantity (QTY). Indicates the quantity of the item used in the breakout shown on the illustration Figure, which is prepared for a functional group, sub functional group, or an assembly.

Figure B-1. JOINT SM&R CODES

Joint SM&R Coding Reference NAVSUP INSTR 4423.29 PUB719 (NSN 0530-LP-011-2960)

Source			Maintenance				Recoverability		Service Option Code	
1st Pos.	2nd Position		3rd Position		4th Position		5th Position		6th Position	
Means of Acquiring Support			Use: Lowest level authorized to remove/replace the item.		Repair: Lowest level with capability and resources to perform complete repair action.		Disposition: When unserviceable or uneconomically repairable, condemn or dispose.		Assigned to support items to convey specific information to the services logistics community/operating forces.	
P	A	Item: Stocked.	O	Org/Unit	O	Org/Unit	O	Org/Unit	1	I-Level 1st degree
	B	Item: Stocked, Insurance.							2	I-Level 2nd degree
	C	Item: Stocked, Deteriorative.					F	I/Afloat	3	I-Level 3rd degree
	D	Item: Support, initial issue of outfitting stocked only for additional initial issue.								
	E	Equipment: Support, stocked for initial issue or outfitting of specified maintenance activities.								
	F	Equipment: Support, nonstocked, centrally procured on demand.	F	I/Afloat	F	I/Afloat	G	Ashore and Afloat	6	Commercial item, organically mfr'd
	G	Item: Stocked for sustained support. Uneconomical to produce at a later time.			G	Ashore and Afloat				
	H	Item: Stocked, contains HAZMAT HMIS/MSDS reporting required.					H	I/Ashore	8	Non-consumable; 2nd degree engine
	R	Terminal or obsolete, replaced.								
	Z	Terminal or obsolete, not replaced.								
K	D	Item: Depot O Organizational (maintenance level) /H & maintenance kits.	G	Ashore and Afloat						
	F	Item: Maintenance kit, place at O Organizational (maintenance level) , F, H, L.			H	I/Ashore				
	B	Item: In both depot repair & maintenance kits.								
M	O	Manufacture or fabricate at unit level.	H	I/Ashore	K	Contractor facility	K	DLR Depot Level Repairable / Contractor facility	9	Non-consumable; 3rd degree engine
	F	Mfr or fab at intermediate/DS level.								
	H	Mfr or fab at intermediate / GS General Schedule (Civil Service employee classification) level.								
	L	Mfr or fab at (SRA specialized repair activity).	K	Contractor Facility					E	End to end test
	G	Mfr or fab at both afloat and ashore.			L	Intermediate SRA	L	Intermediate SRA	J	Inter-service DLR Depot Level Repairable repairable below D-level
	D	Mfr or fab at depot maintenance level.								
A	O	Item: Assembled at org/unit.	L	Intermediate SRA			D	DLR Depot Level Repairable ; Condemn or dispose at depot		
	F	Item: Assembled at intermediate level – afloat.			D	Depot			P	Progressive maintenance
	H	Item: Assembled at intermediate level – ashore.					Z	Non-repairable		
	L	Item: Assembled at SRA.								
	G	Item: Assembled afloat or ashore.								
	D	Item: Assembled at depot maintenance level.	D	Depot	Z	Non-repairable			R	Gold disc repair
X	A	Item: Requisition next higher assembly.					A	Non-repairable but requires special handling		
	B	Item: Not procured or stocked. Available thru salvage. Req. by CAGE Commercial And Government Entity -A document iteration is uniquely identified by a combination of items. One is the Document source /part number.	Z	Ref Only						
	C	Installation drawing, diagram, instruction sheet. Identify by CAGE Commercial And Government Entity -A document iteration is uniquely identified by a combination of items. One is the Document source /part number.			B	Recondition			T	Training devices
	D	Non-stocked. Obtain via local purchase.								

Figure B-2. LUNETTE

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5340015282524	AT-CO-005-000	LUNETTE EYE KIT (INCLUDES ITEM 2)	KIT	1
2	PAOZZ	7M245	5325015699530	AT-CO-005-100	LUNETTE FASTENER KIT (INCLUDES 4 BOLTS AND 4 NUTS)	KIT	1

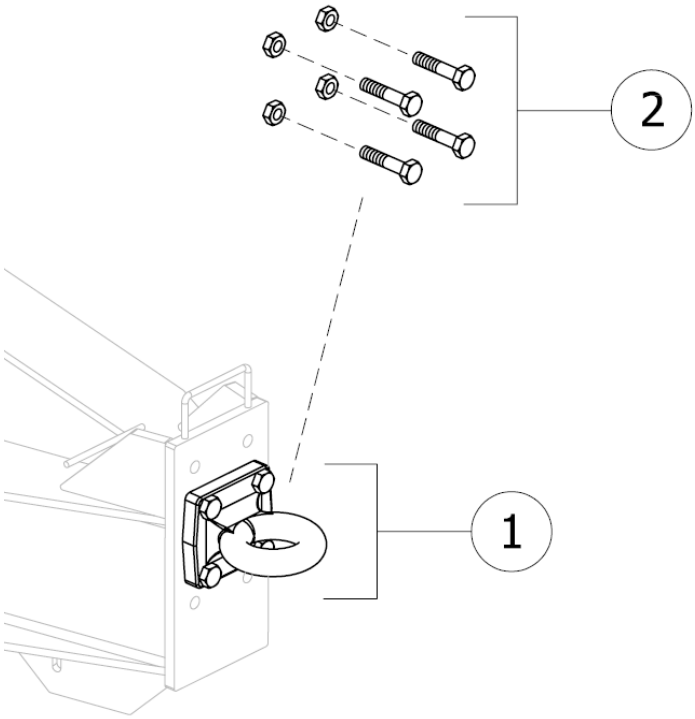


Figure B-3. SAFETY CHAIN

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	4910015699455	AT-CH-500-040	**SAFETY CHAIN REPLACEMENT KIT, COMPLETE W/HOOK, AND CHAIN (INCLUDES ITEMS 4-11)**	KIT	2
2	PAOZZ	7M245	4030015282567	AT-CH-500-030	**LATCH SAFETY HOOK (INCLUDES ITEMS 4-9)**	KIT	2
3	PAOZZ	7M245	4030015282569	AT-CH-500-035	**PARTS KIT, HOOK (INCLUDES ITEMS 7-9)**	KIT	2
4	PAOZZ	7M245			SAFETY HOOK	EA	2
5	PAOZZ	7M245			COTTER PIN	EA	2
6	PAOZZ	7M245			CLEVIS PIN	EA	2
7	PAOZZ	7M245			SAFETY LATCH	EA	2
8	PAOZZ	7M245			SAFETY LATCH SPRING	EA	2
9	PAOZZ	7M245			SAFETY LATCH PIN	EA	2
10	PAOZZ	7M245			SAFETY CHAIN	EA	2
11	PAOZZ	7M245			SAFETY CHAIN MOUNTING BRACKET	EA	2

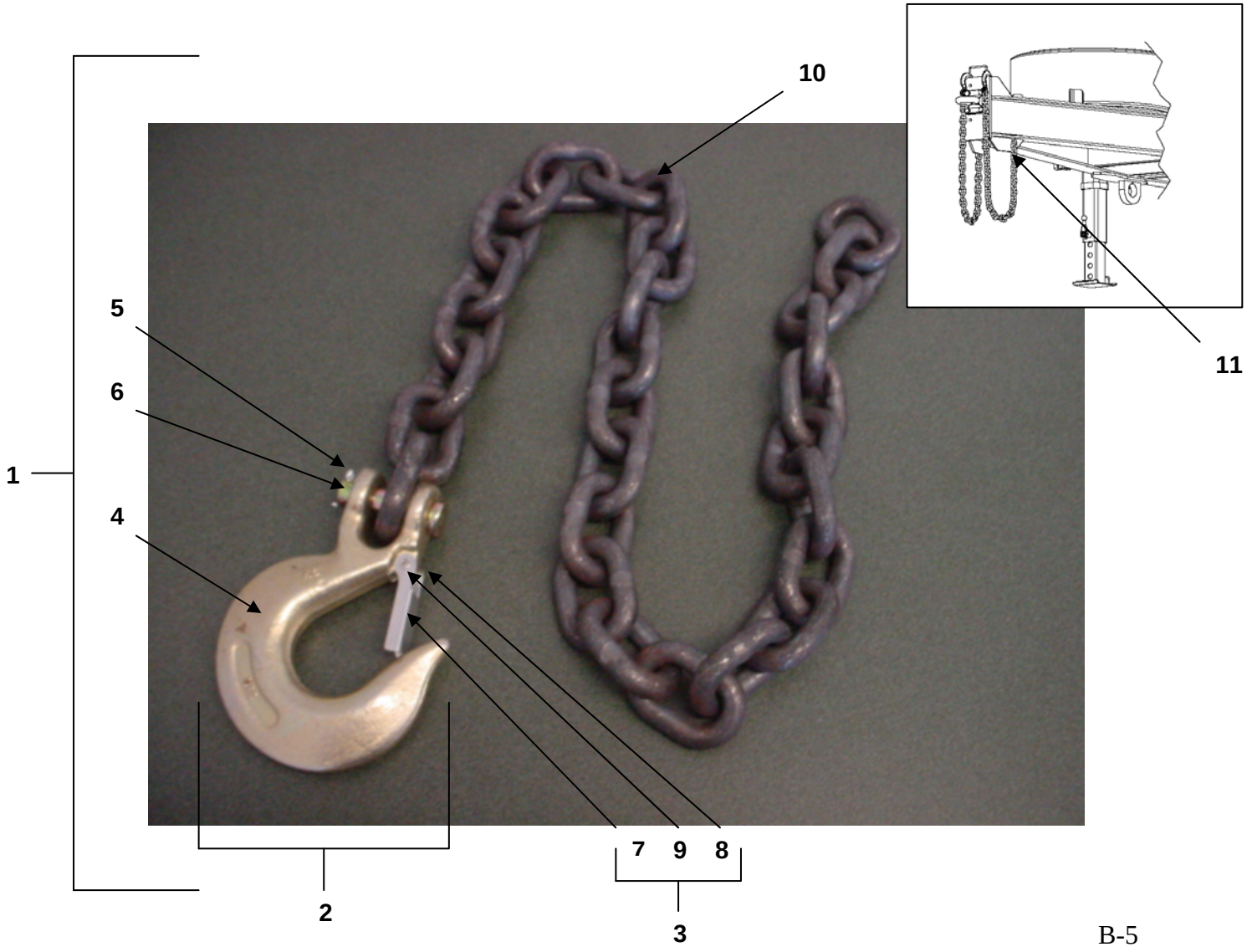


Figure B-4. (1) LANDING LEGS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5340015284267	AT-LG-500-300	DROP LEGS	EA	2
2	PAOZZ	7M245	4910015283654	AT-LG-500-200	JACK, CURBSIDE	EA	1
3	PAOZZ	7M245	4910015283664	AT-LG-500-100	JACK, ROADSIDE	EA	1
4	PAOZZ	7M245	5306015282932	MI-BO-100-150	BOLTS, 5/8-11, 1 1/2", GR 5	EA	16
5	PAOZZ	7M245	5310015283670	MI-BO-100-070	NUTS, 5/8-11, NYLON LOCKING	EA	16
6	PAOZZ	7M245	5340015303632	AT-LG-500-400	CRANK HANDLE	EA	1
7	PAOZZ	7M245	5340015283677	AT-LG-500-410	HANDLE RETAINER BRACKET	EA	1
8	PAOZZ	7M245	5315015284041	AT-LG-500-305	HANDLE RETAINER COTTER PIN, W/ LANYARD	EA	1
9	PAOZZ	7M245	4730015284269	AT-LG-500-315	GREASE FITTING	EA	4
10	PAOZZ	7M245	3040015283682	AT-LG-500-310	CROSS SHAFT, JACK	EA	1
11	PAOZZ	7M245	5306015282916	MI-BO-060-301	BOLT, HHCS, 3/8” X 3”, TAP BOLT, GRADE 5, COURSE THREAD	EA	4
12	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	4
13	PAOZZ	7M245	3040015283683	AT-LG-500-320	EXTENSION CROSS SHAFT, CRANK HANDLE	EA	1
14	XBOZZ	7M245	5340015699472	AT-LG-500-330	TRAILER BRACKETS, MOUNTING SET	PR	2
15	XBOZZ	7M245		AT-LG-500-340	JACKPLATE, MOUNTING SET	EA	2

Figure B-4. (2) LANDING LEGS

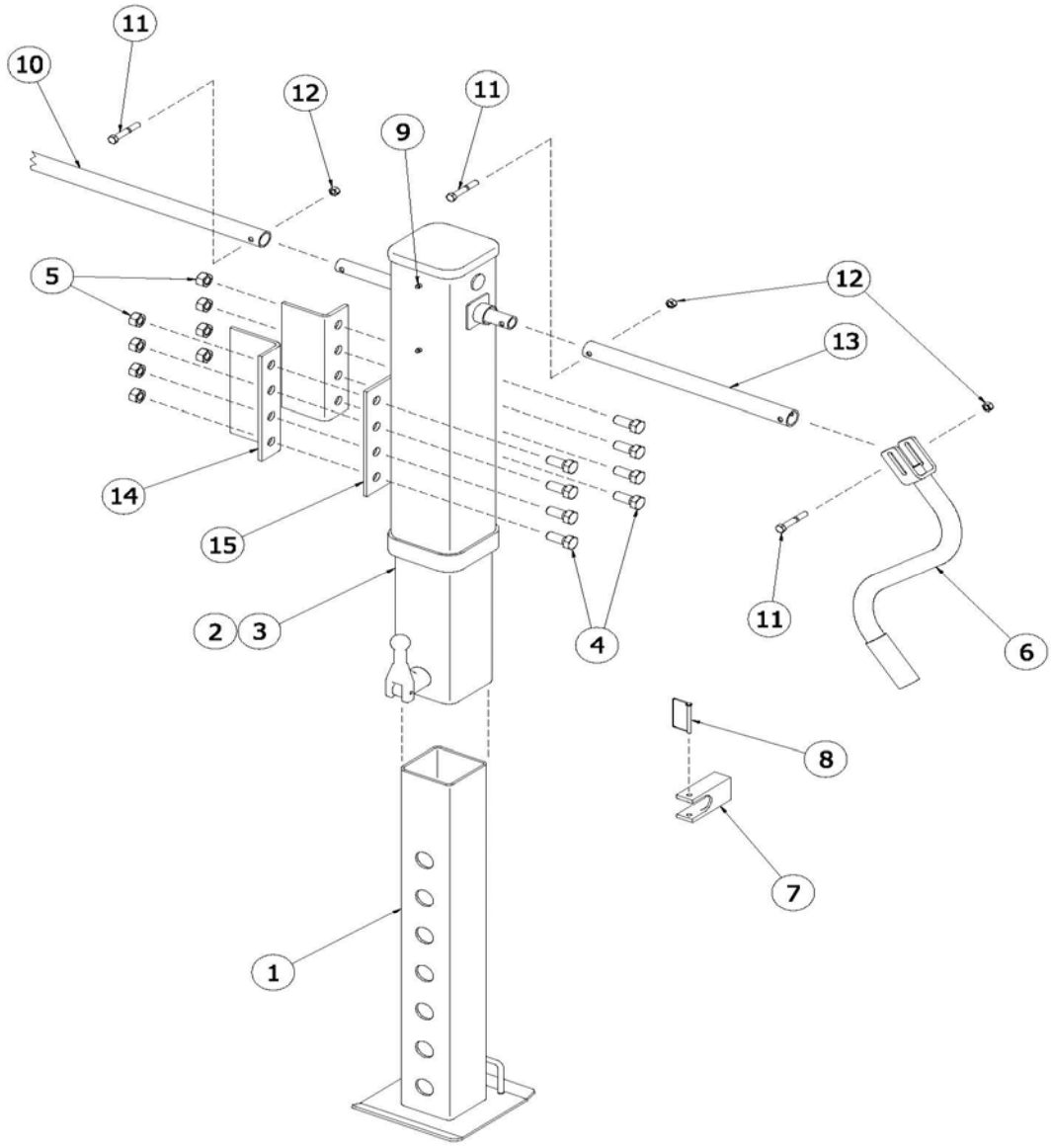


Figure B-5 STABLIZER LEGS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PACZZ	7M245	5340015283273	AT-AA-500-300	DROP LEG EXTENSION, 2 ½" SQ. TUBE	EA	2
2	PACZZ	7M245	5340015283275	AT-AA-500-310	90 DEG DROP LEG, 3" SQ. TUBE	EA	2
3	PACZZ	7M245	5315015283263	AT-AA-500-320	LOCK PIN, W/ RESTRAINT CHAIN	EA	4
4	PACZZ	7M245	5315015283266	AT-AA-015-000	RETAINER PIN, 1/8"	EA	4

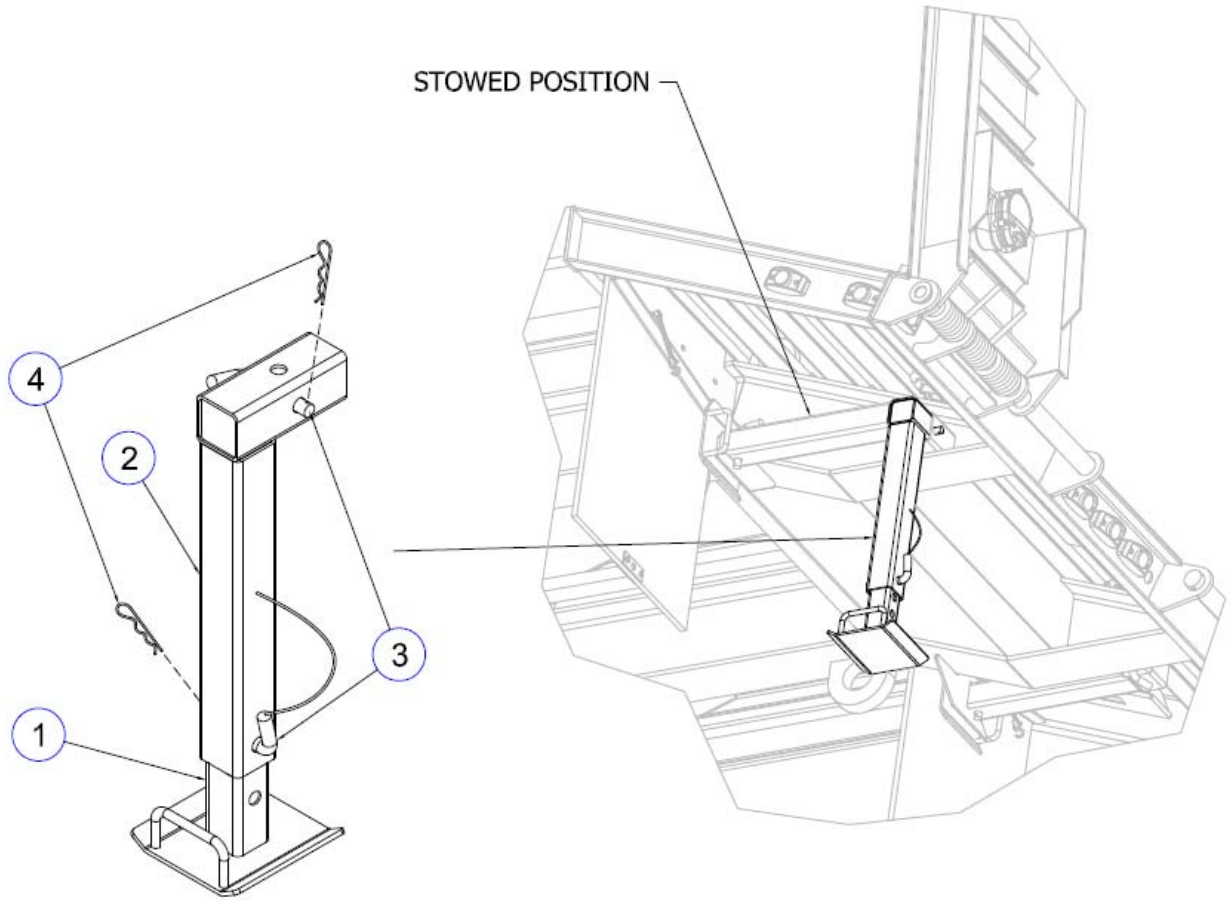
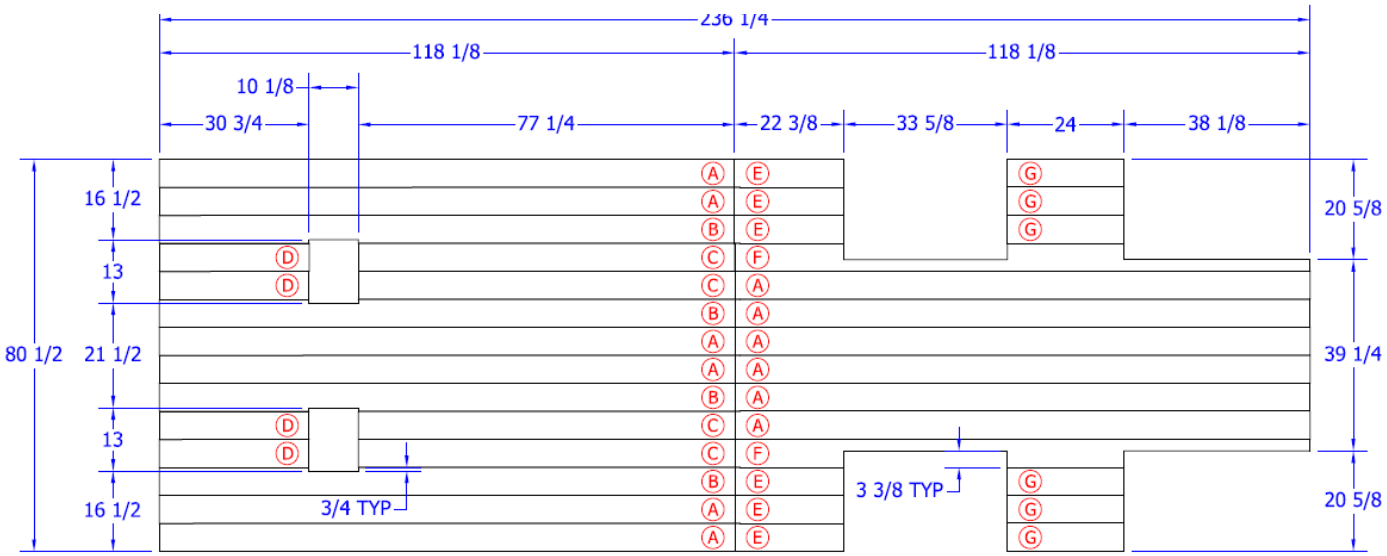


Figure B-6. DATA PLATES

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5320015283268	MI-FA-020-000	RIVETS, ALUMINUM HOUSING, STEEL PIN, 3/16" X 1/2"	EA	10
2	XBOZZ	7M245		AT-AA-300-144	DATA PLATE: IDENTIFICATION	EA	1
3	XBOZZ	7M245		AT-AA-300-145	DATA PLATE: WEIGHT AND DIMENSIONAL	EA	1

Figure B-7. DECK BOARDING

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5510015283418	LU-BO-010-000	OAK, 5 ¾" X 9' 10 1/8", TREATED	EA	26
2	PAOZZ	7M245	5305015282717	LU-SC-516-250	FLOOR SCREW, 5/16" TOR X 40 HEAD X 3	BX	260



ITEM	QUANTITY	LENGTH
A	12	118 1/8"
B	4	118 1/8" W/ 1 NOTCH
C	4	77 1/4"
D	4	30 5/8"
E	6	22 3/8"
F	2	118 1/8" W/ 2 NOTCHES
G	6	24"

Figure B-8. TIE DOWNS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	94658	5340014993719	F133-2-1	CARGO TIE DOWNS (D-LINK ASSY)	EA	26
2	PAOZZ	7M145	5340015283374	ST-PL-100-130	FRONT TRAILER LIFT LUG	EA	2
3	PAOZZ	7M245	5340015283376	ST-PL-100-140	REAR TRAILER LIFT LUG	EA	2
4	PAOZZ	7M245	5340015283639	ST-TP-250-100	TRAILER LIFT COVER	EA	2
5	PAOZZ	7M245	4010015282560	AT-CH-188-100	RESTRAINT CHAIN, TRAILER LIFT COVER	EA	2
6	PAOZZ	7M245	3990015282546	ST-PL-125-100	FRONT TRAILER TIE DOWN	EA	2
7	PAOZZ	7M245		FA-PL-280-210	REAR TRAILER TIE DOWN	EA	2
8		7M245		FA-PL-280-210	SUPPLEMENTAL TIE DOWN	EA	2

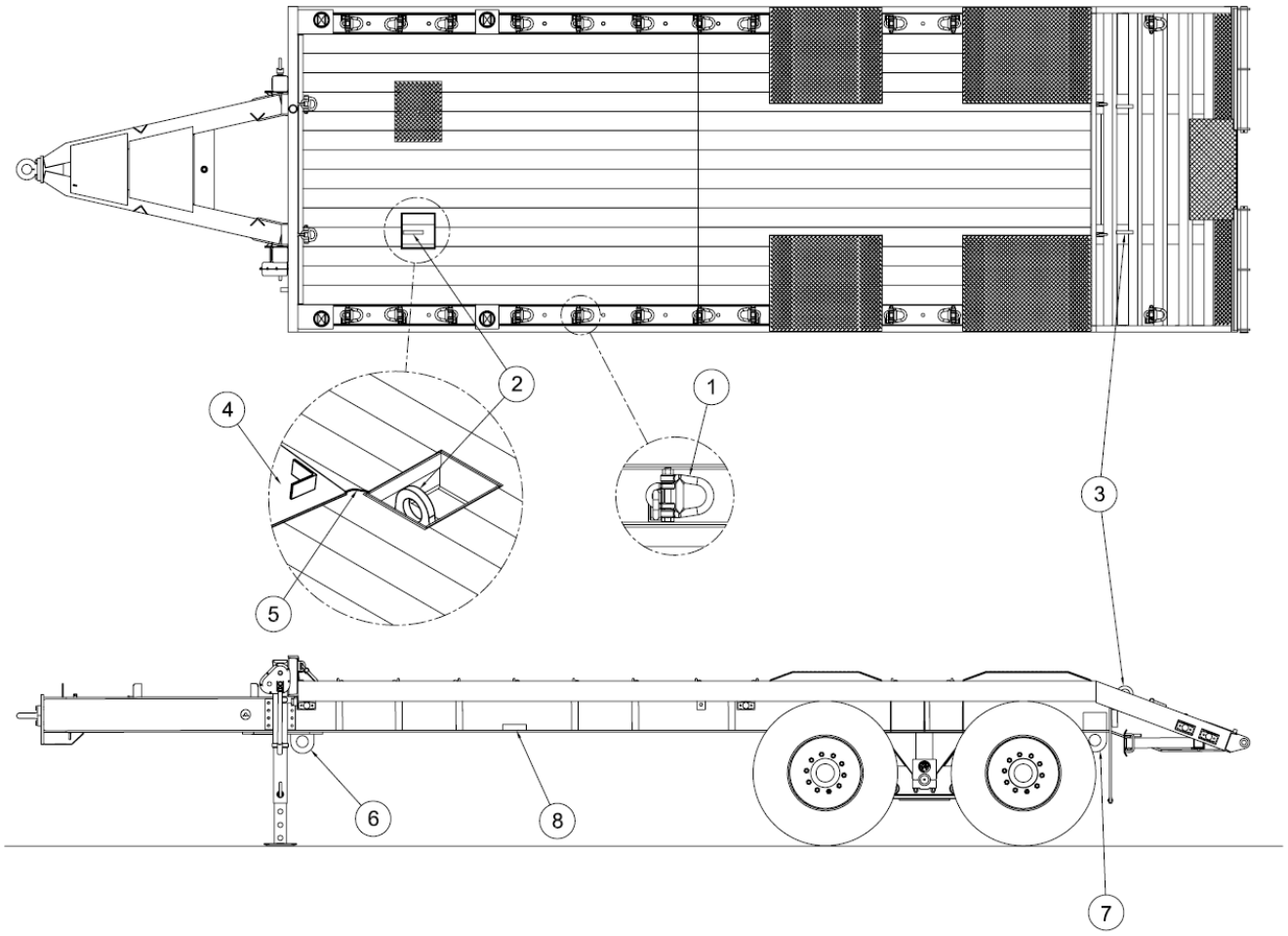


Figure B-9 RAMPS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245		AT-AA-500-521	RAMP, COMPLETE L HAND	EA	1
2	PAOZZ	7M245		AT-AA-500-522	RAMP, COMPLETE R HAND	EA	1
3	PAOZZ	7M245	5340015283392	AT-AA-250-000	SPRINGS, 9/16” WIRE	EA	6
4	PAOZZ	7M245	5340015283497	ST-PL-500-100	RAMP HINGE	EA	4
5	PAOZZ	7M245	5340015283396	ST-HR-200-100	RAMP HINGE PIN	EA	2
6	PAOZZ	7M245	5306015282916	MI-BO-060-301	BOLT, HHCS, 3/8” X 3”, TAP BOLT, GRADE 5, COURSE THREAD	EA	2
7	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	2
8	PACZZ	7M245	5340015282380	AT-CH-888-040	LOAD BINDER, RATCHET	EA	2
9	PACZZ	7M245	4010015282561	AT-CH-375-100	RAMP RESTRAINT CHAIN (LOWER)	EA	2
10	PACZZ	7M245	4010015282564	AT-CH-188-110	RESTRAINT CHAIN W/SNAP LINK	EA	2
11	PACZZ	7M245	4010015282566	AT-CH-375-110	RAMP RESTRAINT CHAIN (UPPER)	EA	2
12	PAOZZ	7M245	5340015283401	ST-PL-250-140	RAMP LIFTING BRACKET	EA	2
13		7M245		ST-PL-500-110	RAMP HINGE PIN SUPPORT EYE ASSY	EA	2

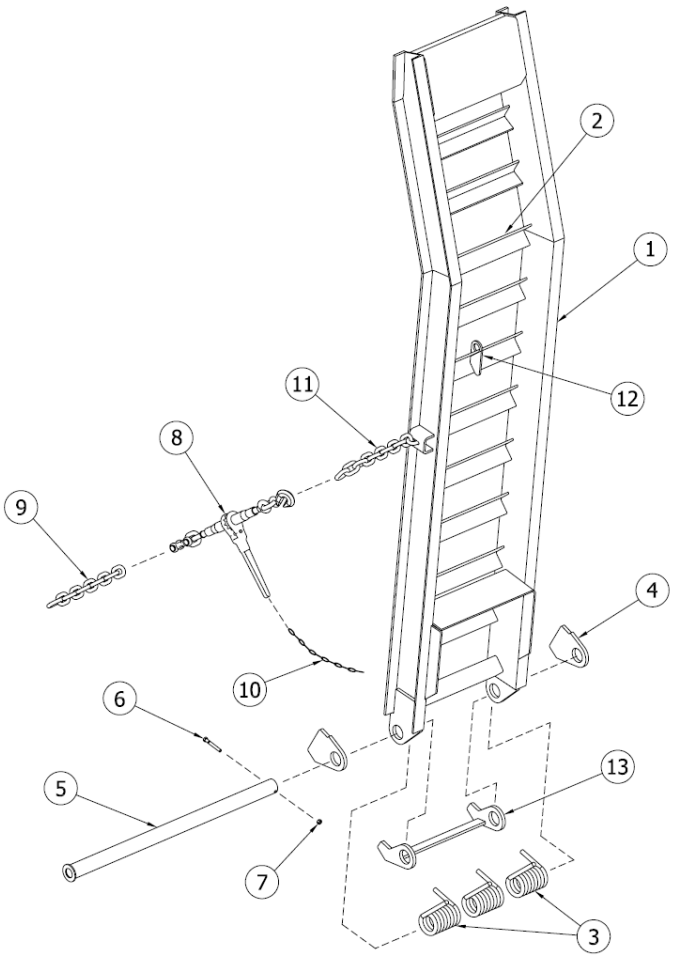


Figure B-10. TOOL BOXES

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245		ST-PL-135-110	DRAWBAR TOOL BOX COVER	EA	1
2	PAOZZ	7M245		AT-AA-750-200	DRAWBAR TOOL BOX HINGE	EA	1
3	PAOZZ	7M245		ST-PL-250-150	BEAVERTAIL TOOL BOX COVER	EA	1
4	PAOZZ	7M245		AT-AA-750-200	BEAVERTAIL TOOL BOX HINGE	EA	1
5	PAOZZ	7M245	5340015283536	ST-HR-040-100	BEAVERTAIL TOOL BOX HANDLE	EA	1

Figure B-11. SPARE TIRE ASSEMBLY

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PACZZ	7M245	5340015700372	AT-AA-500-330	HOLD DOWN BAR W/CHAIN	EA	1
2	PACZZ	7M245	5306015282919	AT-AA-500-280	WING BOLT	EA	1
3	XBOZZ	7M245	5340015283403	AT-AA-500-290	SPARE TIRE BRACE	EA	4

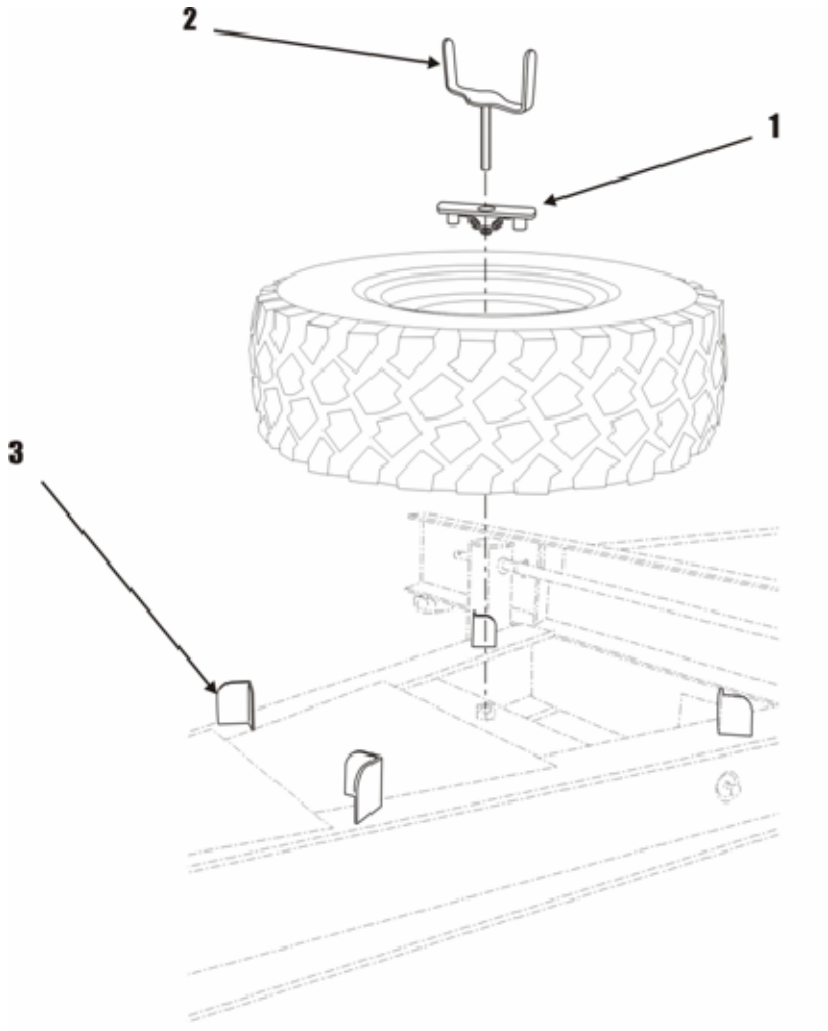


Figure B-12. MUD FLAP ASSEMBLY

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	2540015282526	AT-AA-500-210	MUD FLAP, ONE EACH	EA	2
2	PAOZZ	7M245	5340015283406	ST-PL-135-070	MUD FLAP CLAMP BRACKET, ONE EACH	EA	2
3	PAOZZ	7M245	5340015283408	ST-PL-135-000	MUD FLAP ROLL UP BRACKET, ONE EACH	EA	4
4	PACZZ	7M245	5340015283541	AT-AA-500-250	MUD FLAP ROLL UP RUBBER RESTRAINT CORD W/ S HOOK, ONE EACH	EA	2
5	PAOZZ	7M245		MI-BO-040-125	BOLTS, 1/4”-20 X 1 3/4”, GRADE 5	EA	2
6	PAOZZ	7M245	5306015282924	MI-BO-060-150	BOLT.3/8” X 1 1/2”, GR5, HHCS, ZINC PLATED	EA	8
7	PAOZZ	7M245	5306015282926	MI-BO-040-110	BOLT. HHCS, 1/4” X 1”, GRADE 5, COURSE THREAD	EA	4
8	PAOZZ	7M245	5310015282952	MI-BO-060-060	3/8” FLAT WASHER, USS, PLATED	EA	16
9	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	8
10	PAOZZ	7M245	5310015282955	MI-BO-040-060	LOCKNUT, 1/4-20 W/ NYLON INSERT	EA	6
11	PAOZZ	7M245		MI-BO-040-030	1/4” FLAT WASHER, SAE	EA	4

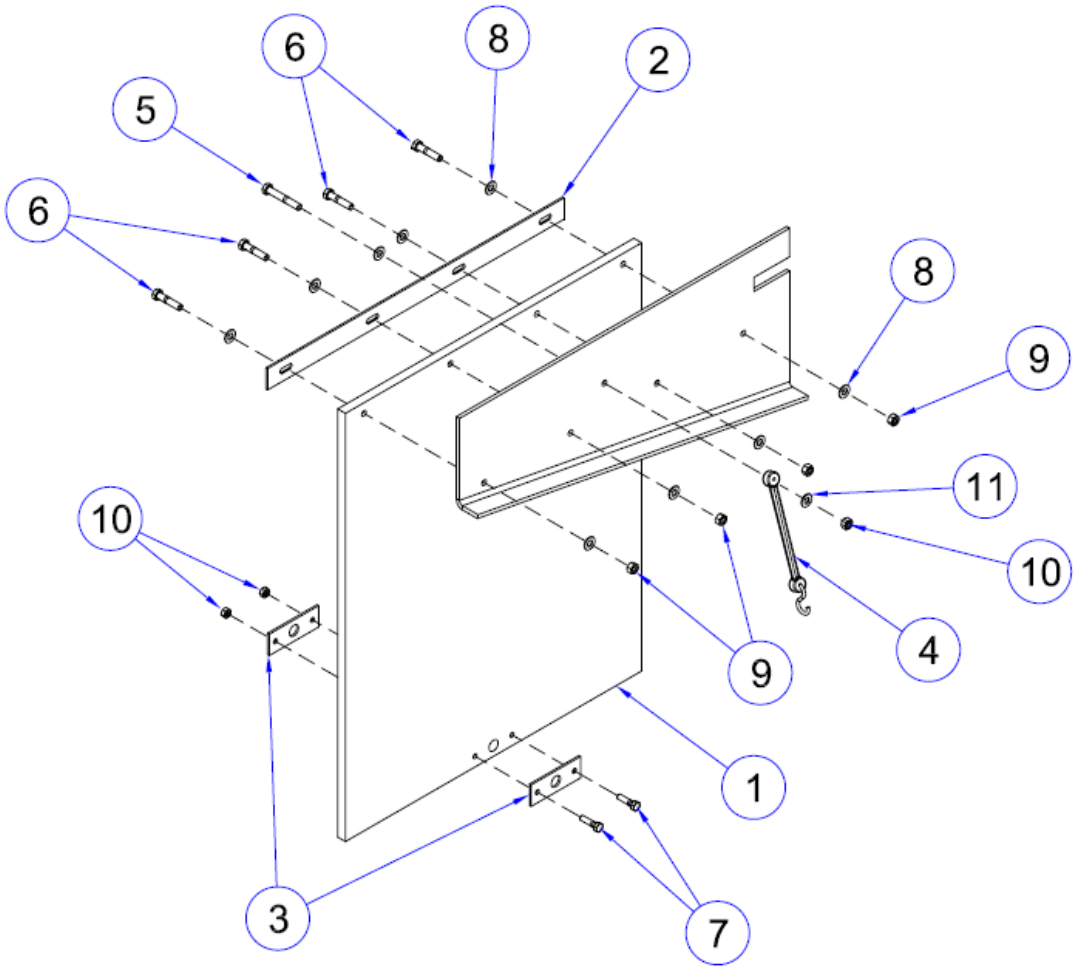


Figure B-13. TIRE AND WHEEL ASSEMBLY

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PACZZ	7M245		53254	TIRE	EA	5
2	PAOOO	7M245		RG-AW-298-050	WHEEL, COMPLETE	EA	5
3	PACZZ	7M245		RG-AH-999-059	LUG NUTS	EA	40
4	PAOZZ	7M245		RG-AT-200-500	VALVE STEM	EA	5
5	PACZZ	7M245		AT-AA-340-010	CHOCK BLOCKS WITH LANYARD	PR	1

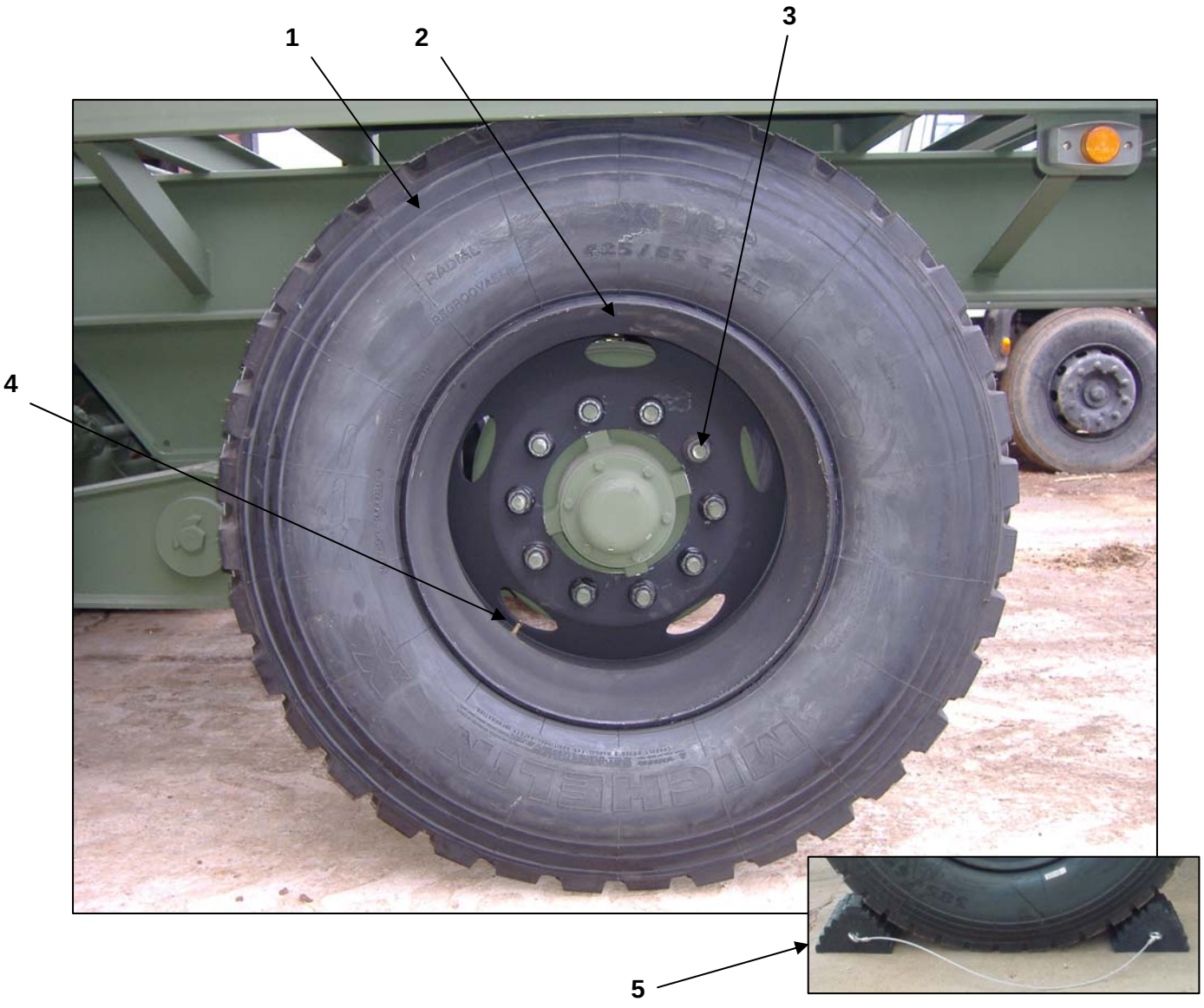
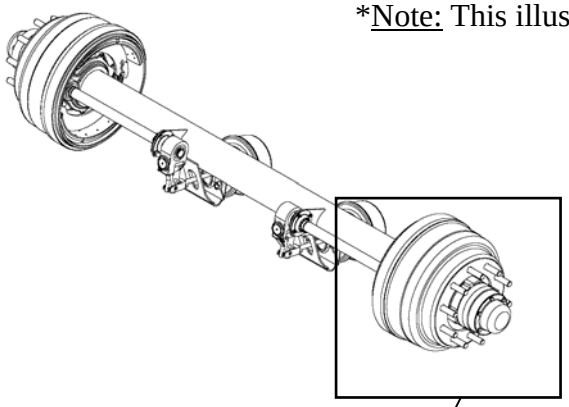


Figure B-14. (1) HUB/DRUM ASSEMBLY (PER HUB)

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOOO	7M245		RG-AH-998-244	HUB & DRUM ASS'Y, 10-11.25 IN., CUPS & STUDS	EA	1
2	PAOZZ	7M245	3110015403474	031-026-01	INNER BEARING CUP	EA	1
3	PAOZZ	7M245		031-026-02	INNER BEARING CONE	EA	1
4	PAOZZ	7M245	3110015401373	031-027-01	OUTER BEARING CUP	EA	1
5	PAOZZ	7M245		031-027-02	OUTER BEARING CONE	EA	1
6	PAOZZ	7M245	5330014084834	010-055-01	GREASE SEAL FOR HUB	EA	1
7	PAOZZ	7M245	5330015283271	071-124-00	GASKET FOR GREASE CAP	EA	1
8	PAOZZ	7M245	2530015282442	021-046-00	GREASE CAP	EA	1
9	PAOZZ	7M245	5310015282962	005-100-00	LOCK WASHER	EA	6
10	PAOZZ	7M245	5305015282720	007-157-00	CAP SCREW	EA	6
11	PAOZZ	7M245	5307015282935	007-194-00	M22 WHEEL STUD	EA	10
12	PAOZZ	7M245	5310015282969	006-118-00	M22 SWIVEL FLANGE NUT	EA	10
13	KFOZZ	7M245	3120015282538	RG-AH-100-000	**PARTS KIT, BEARING REPLACEMENT KIT (PER WHEEL, INCLUDES ITEMS 2-10)**	KIT	1

Figure B-14. (2) HUB/DRUM ASSEMBLY (PER HUB)

*Note: This illustration covers both axles.



*Note: This breakdown covers all 4 hub assemblies.

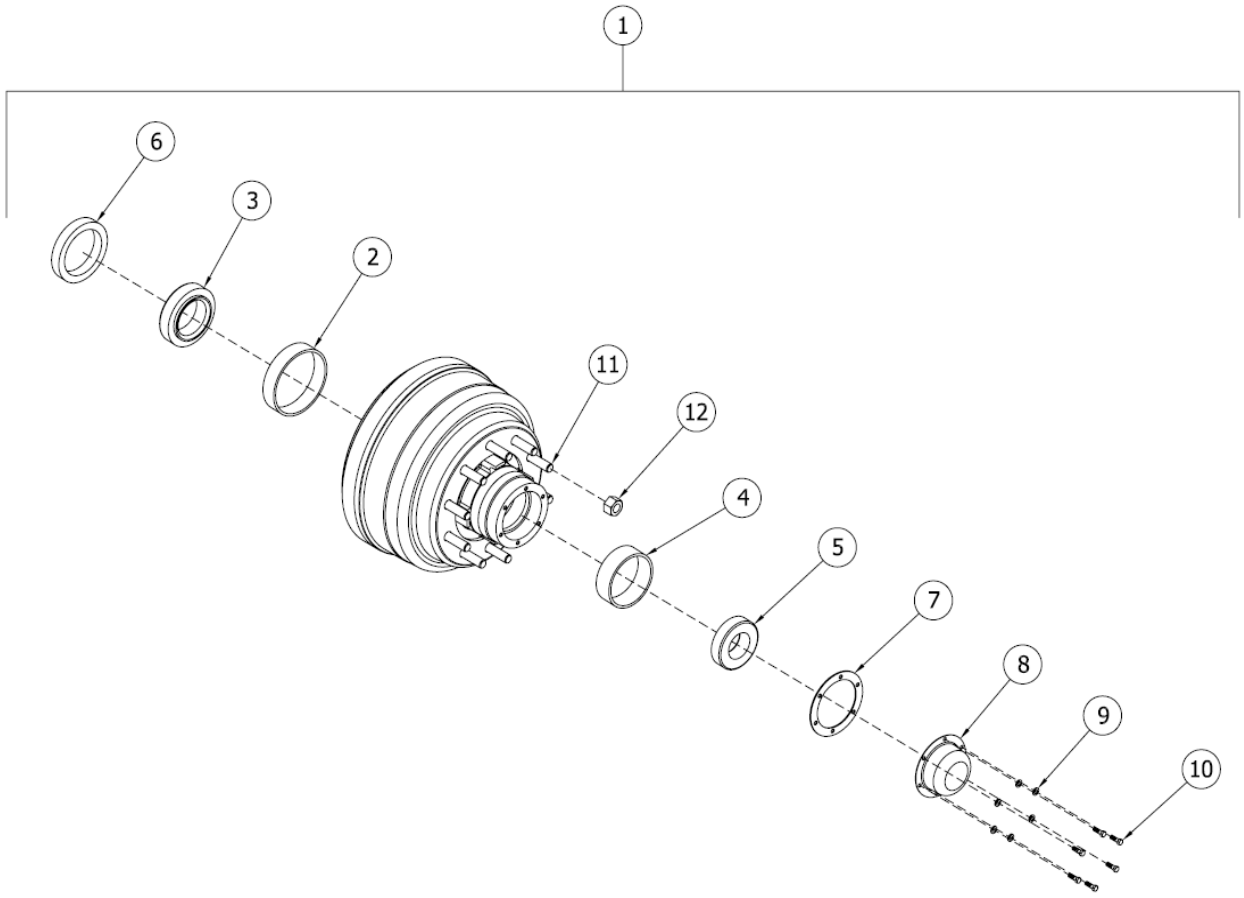
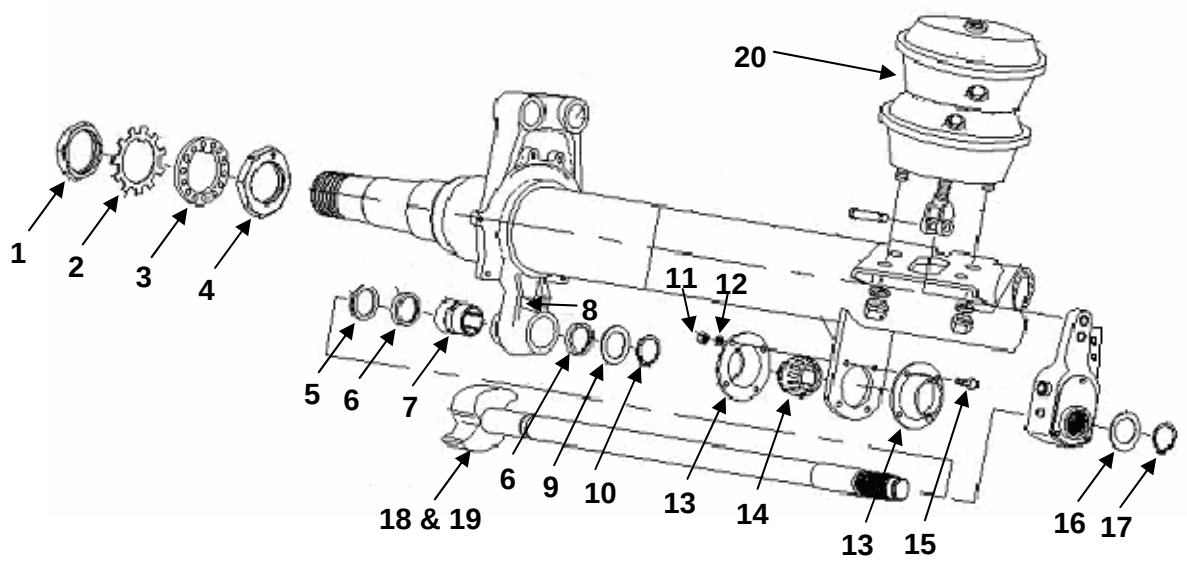


Figure B-15. (1) AXLE/BRAKE COMPONENTS (PER AXLE)

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5310015282976	006-115-00	OUTER SPINDLE NUT, 2.63"	EA	2
2	PAOZZ	7M245	5310015282977	005-099-00	SPINDLE TAG WASHER	EA	2
3	PAOZZ	7M245	5310015283257	005-098-00	SPINDLE INDEXING WASHER	EA	2
4	PAOZZ	7M245	5310015283260	006-114-00	INNER SPINDLE NUT, 2.63"	EA	2
5	KBOZZ	7M245		005-096-00	1.5" X .120" WASHER	EA	2
6	PAOZZ	7M245	5330015283269	010-052-00	GREASE SEAL FOR SPIDER, 1.5"	EA	4
7	KBOZZ	7M245	3120014874955	014-056-00	SPIDER BUSHING	EA	2
8	PAOZZ	7M245	4730015282570	061-006-00	GREASE FITTING 65°	EA	2
9	KBOZZ	7M245		005-097-00	1.5" X .06" WASHER	EA	2
10	KBOZZ	7M245		069-020-00	1.50” SNAP RING	EA	2
11	PAOZZ	7M245	5310015282937	006-099-00	1/4" HEX NUT	EA	8
12	PAOZZ	7M245	5310015282943	005-079-00	1/4" LOCK WASHER	EA	8
13	PAOZZ	7M245	3040015282535	034-032-00	RETAINER PLATE FOR CAMSHAFT SUPPORT BRACKET	EA	4
14	KBOZZ	7M245		014-058-00	SUPPORT BUSHING	EA	2
15	PAOZZ	7M245	5305015282576	007-139-00	1/4" CAP SCREW	EA	8
16	KBOZZ	7M245		005-134-00	1.26" WASHER	EA	2
17	KBOZZ	7M245		069-078-00	1.25” SNAP RING	EA	2
18	PAOZZ	7M245	2530015282425	034-192-03	LH CAMSHAFT, 23.44” LONG	EA	1
19	PAOZZ	7M245	2530015282429	034-193-03	RH CAMSHAFT, 23.44” LONG	EA	1
20	PAOZZ	7M245	2530015282431	034-058-01	AIR CHAMBER	EA	1
21	PAOZZ	7M245	2530015282437	RG-AA-500-510	AXLE, BEAM ONLY, W/ BRAKE CAMS	EA	1
22	PAOZZ	7M245		RG-AA-500-000	AXLE, COMPLETE W HUB AND DRUMS	EA	1

Figure B-15. (2) AXLE/BRAKE COMPONENTS (PER AXLE)



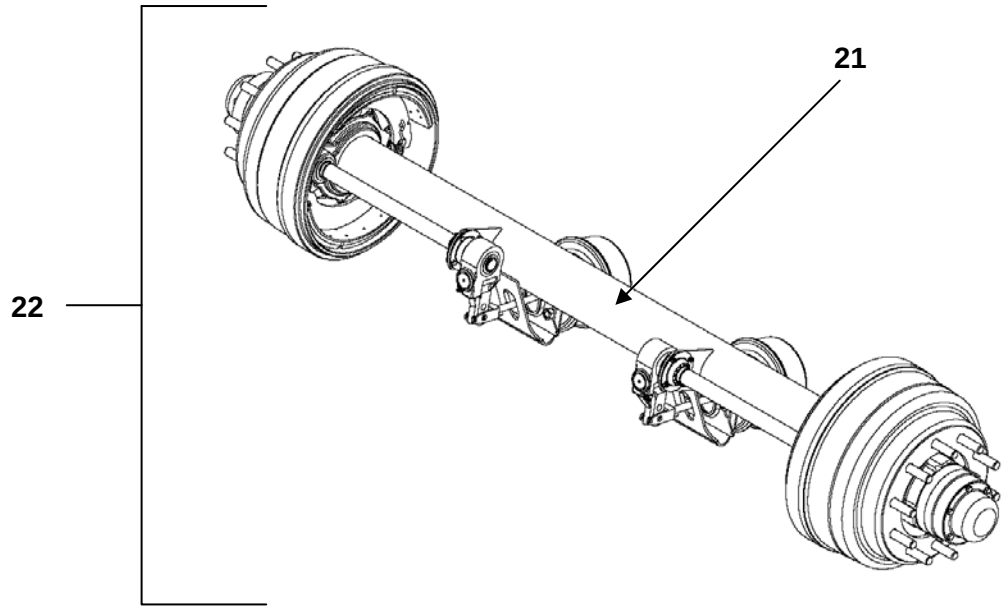


Figure B-16. AUTOMATIC SLACK ADJUSTER (PER WHEEL)

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	KFOZZ	7M245		RG-AB-712-090	**AUTOMATIC SLACK ADJUSTER, SERVICE REPAIR KIT (INCLUDES ITEMS 2-4)**	KIT	1
2	PAOZZ	7M245	2530015282460	055-040-08	ADUJUSTER , SLACK BRAKE	EA	1
3	PAOZZ	7M245	5340015283411	055-053-02	CLEVIS ROD END	EA	1
4	PAOZZ	7M245	5340015303623	055-054-00	CLEVIS ROD END	EA	1

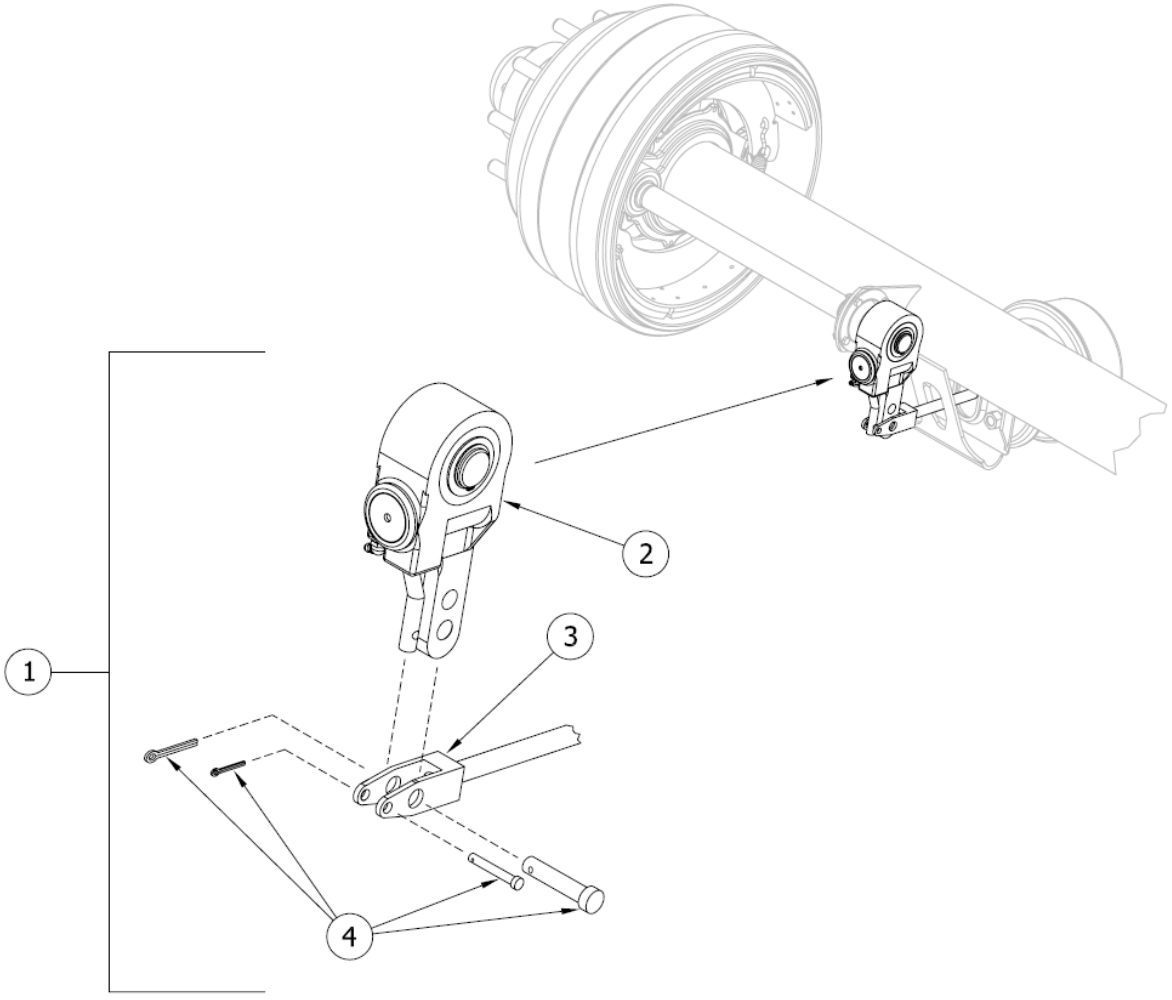


Figure B-17. SHOE ASSEMBLY KIT (PER BRAKE)

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245		RG-AB-165-702	BRAKE SHOE SET W/ AP KIT	KIT	1

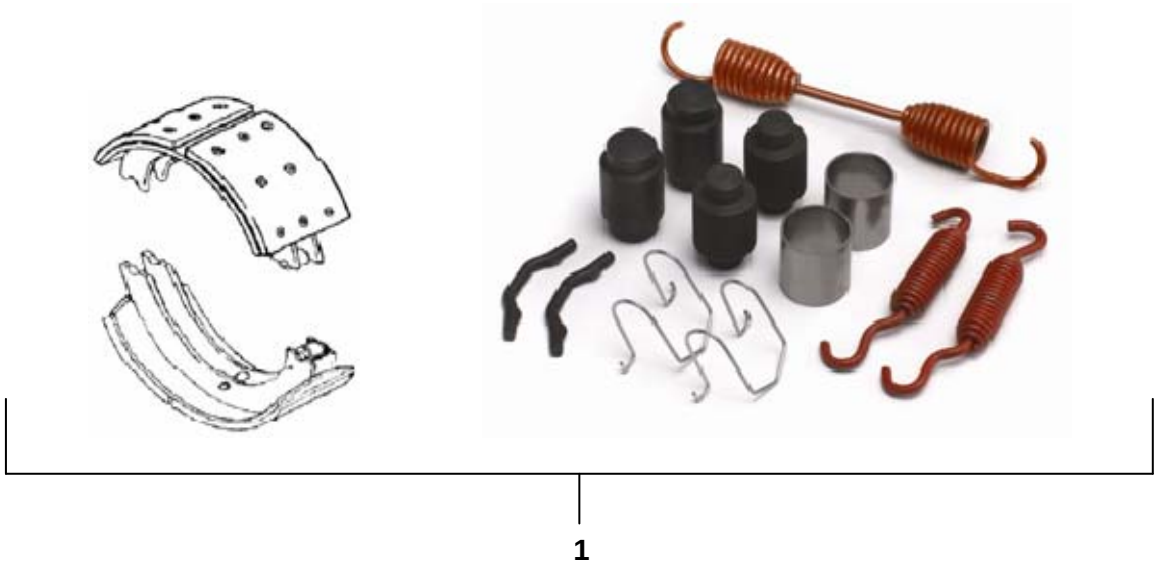


Figure B-18. BRAKE SHOE HARDWARE KIT (PER BRAKE)

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	KBOZZ	7M245	2530015398697	K71-136-00	BRAKE SHOE AP KIT	KIT	1
2	PAOZZ	7M245	3120014874955	014-056-00	SPIDER BUSHING	EA	2
3	PAOZZ	7M245	5315014874638	056-017-00	PIN, SHOULDER, HEADLESS	EA	2
4	PAOZZ	7M245		014-065-00	BRAKE SHOE ROLLER	EA	2
5	PAOZZ	7M245	5340015401257	071-122-00	RETAINER NUT AND BOLT	EA	2
6	PAOZZ	7M245	5360015408104	046-096-00	SPRING, HELICAL EXTENSION	EA	1
7	PAOZZ	7M245	5315014874648	056-018-00	PIN, STRAIGHT HEADLESS	EA	2
8	PAOZZ	7M245	5360015070474	046-097-00	SPRING, HELICAL EXTENSION	EA	2
9	PAOZZ	7M245		059-554-00	INSTRUCTION SHEET	EA	1

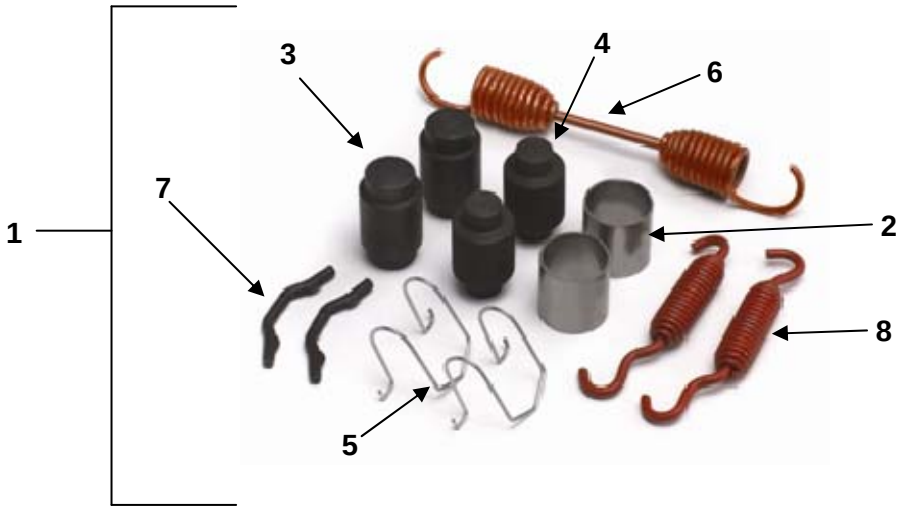


Figure B-19. CAMSHAFT REPAIR KIT (PER BRAKE)

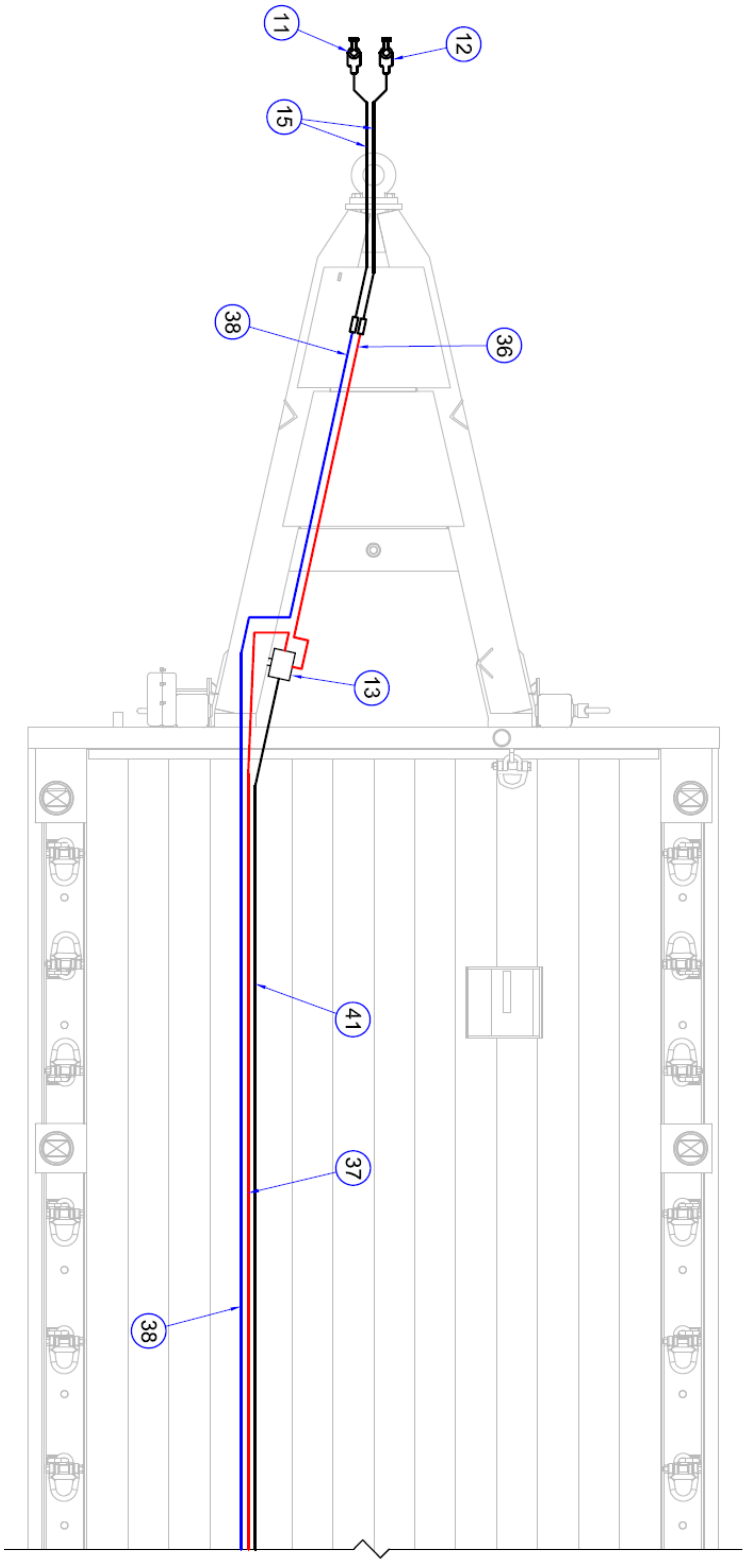
ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
	PAOZZ	7M245	2530015282400	K71-135-00	CAMSHAFT REPAIR KIT	EA	1
1	KBOZZ	7M245		005-096-00	1.5” X .120” WASHER	EA	1
2	PAOZZ	7M245	5330015283269	010-052-00	GREASE SEAL FOR SPIDER, 1.5”	EA	2
3	KBOZZ	7M245		014-056-00	SPIDER BUSHING	EA	1
4	KBOZZ	7M245		005-097-00	1.5” X .06” WASHER	EA	2
5	KBOZZ	7M245		005-134-00	1.26” WASHER	EA	1
6	KBOZZ	7M245		069-020-00	1.50” SNAP RING	EA	2
7	KBOZZ	7M245		069-078-00	1.25” SNAP RING	EA	1
8	KBOZZ	7M245		014-058-00	SUPPORT BUSHING	EA	1
9	PAOZZ	7M245	4730015282570	061-006-00	GREASE FITTING 65°	EA	1
10	KBOZZ	7M245		059-554-00	INSTRUCTION SHEET	EA	1

CAMSHAFT REPAIR KIT

Figure B-20. (1) ABS AIR BRAKE COMPONENTS

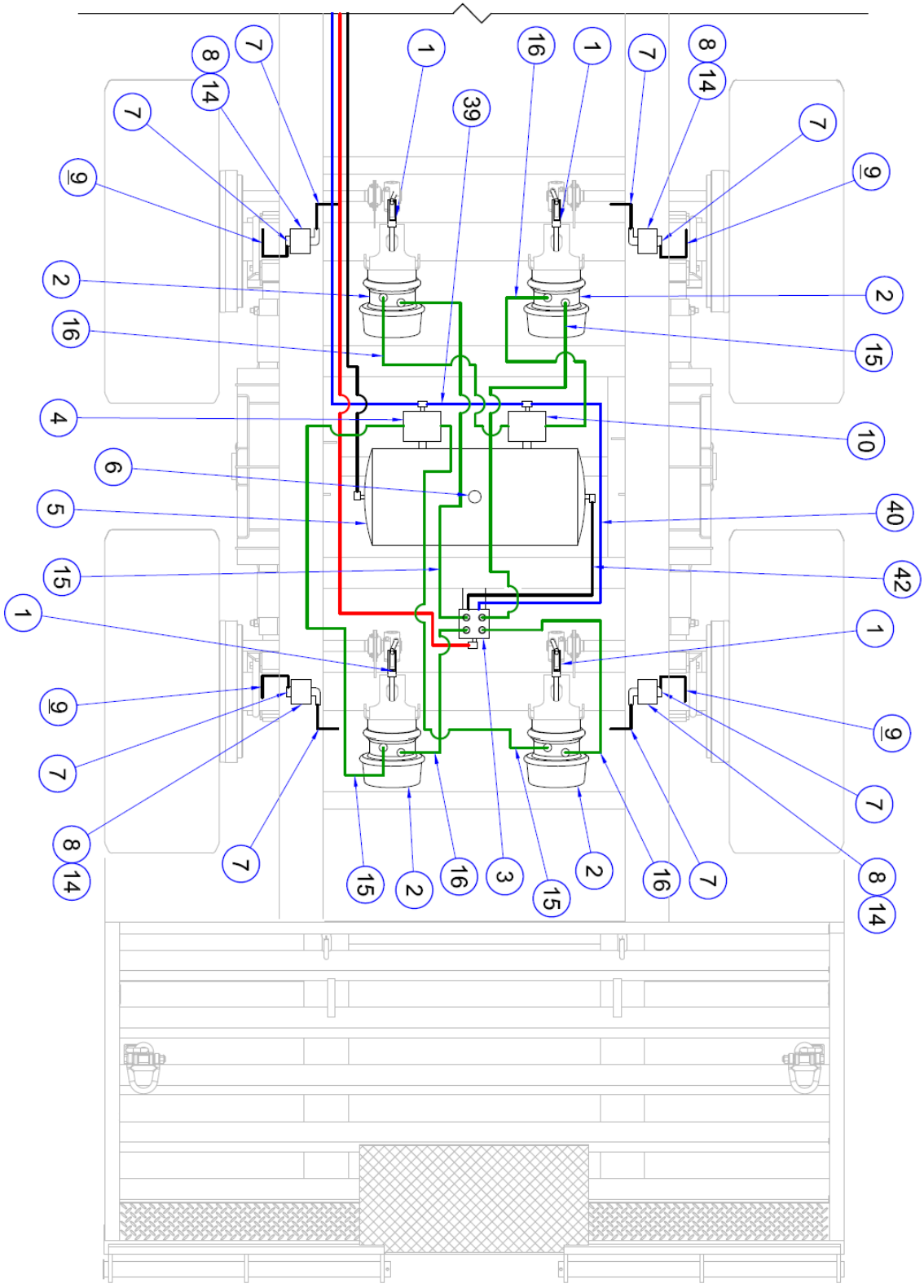
ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	2530015282486	RG-AB-712-030	AUTOMATIC SLACK ADJUSTER	EA	4
2	PAOZZ	7M245	2530015282493	BR-AI-606-100	SPRING BRAKE CHAMBER	EA	4
3	PAOZZ	7M245	2530015282512	BR-AB-500-120	SPRING BRAKE VALVE, RT4	EA	1
4	PA*OZZ	7M245	2530015282514	BR-AB-500-100	VALVE, MOD2 ABS W/SLH	EA	1
5	PAOZZ	7M245	2530015282516	BR-AI-601-400	AIR RESERVOIR, 2800 CU. IN	EA	1
6	PAOZZ	7M245	2530015282521	BR-AF-040-454	VALVE, DRAIN PETCOCK	EA	1
7	PAOZZ	7M245	5930015282418	BR-AB-500-140	ABS SENSOR	EA	4
8	PAOZZ	7M245	5930015282423	BR-AB-200-060	ABS BLOCK, SENSOR	EA	4
9		7M245		SEE FIGURE B-15	ABS EXCITER (PART OF HUB ASSY)	EA	4
10	PAOZZ	7M245	4810015282572	BR-AB-500-110	ABS VALVE (12 PORT) 24V	EA	1
11	PAOZZ	7M245	5340015283551	BR-AF-301-000	GLADHAND SERVICE/CONTROL	EA	1
12	PAOZZ	7M245	5340015283554	BR-AF-302-000	GLADHAND EMERGENCY/SUPPLY	EA	1
13	PAOZZ	7M245	2815015284263	BR-AB-500-130	VALVE, HOSTLER	EA	1
14	PAOZZ	7M245	5340015283563	BR-AB-200-020	ABS SENSOR CLIP	EA	4
15	PAOZZ	7M245	4720015293170	BR-AI-306-060	AIR HOSE 60” SWIVEL ASS’Y, 3/8” ID	EA	6
16	PAOZZ	7M245	4720015293175	BR-AI-306-036	AIR HOSE 36” SWIVEL ASS’Y, 3/8” ID	EA	4
17	PAOZZ	7M245		BR-AI-303-060	REMOTE PETCOCK CABLE SLEEVE	EA	1
18	PAOZZ	7M245	5340015283598	MI-FA-050-100	NYLON TIE, 8” HD UV RESISTANT, BLACK	EA	84
19	PAOZZ	7M245	5340015293187	MI-FA-080-000	NYLON TIE, NATURAL, 21” LONG, HEAVY DUTY	EA	12
20	PAOZZ	7M245	5340015293192	BF-AI-302-100	DUMMY GLADHAND W/ CABLE	EA	2
21	PAOZZ	7M245	4730015293195	LT-WI-750-604	SPLIT LOOM, 1/2” ID (4’ FOR TOTAL SYSTEM	EA	1
22	PAOZZ	7M245	4730015293208	HY-FT-060-100	90° STREET ELBOW, 3/8” MNPT X 3/8” FNPT	EA	6
23	PAOZZ	7M245	5365015293212	BR-AF-080-060	BUSHING HEX 1/2”-3/8” NPT	EA	4
24	PAOZZ	7M245		BR-AF-080-200	NIPPLE 1/2” EH X CLOSE	EA	2
25	PAOZZ	7M245	4730015293767	BR-AF-060-109	PLUG, 3/8” BLACK PIPE	EA	1
26	PAOZZ	7M245	4730015293772	BR-AF-080-008	PLUG, 1/2” BLACK PIPE	EA	1
27	PAOZZ	7M245	4730015293773	BR-AF-300-080	FRAME NIPPLE, 3/8” FNPT X 1/2” NAB	EA	2
28	PAOZZ	7M245	2590015293781	BR-AI-601-200	RUBBER PAD FOR AIR TANK	EA	2
29	PAOZZ	7M245	5306015282924	MI-BO-060-150	BOLT, 3/8” X 1 1/2” GR5 HHCS, ZINC PLATED	EA	4
30	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	4
31	PAOZZ	7M245	5310015282952	MI-BO-060-060	3/8” FLAT WASHER, USS, PLATED	EA	8
32	PAOZZ	7M245	5305015293159	MI-BO-040-125	BOLT, 1/4” X 1 1/4” GRADE 5, HEX HEAD, PLATED	EA	30
33	PAOZZ	7M245	5310015282955	MI-BO-040-060	LOCKNUT, 1/4-20 W/ NYLON INSERT	EA	30
34	PAOZZ	7M245	4730015291503	LT-WI-276-000	LOOM CLAMP #12, 3/4” ID VINYL COATED STEEL	EA	17
35	PAOZZ	7M245	4730015291504	LT-WI-278-000	LOOM CLAMP #16, 1” ID VINYL COATED STEEL	EA	15
36	PAOZZ	7M245		BR-AI-310-200	NYLON AIR BRAKE TUBING ASS’Y, RED; HOSTLER VALVE TO EMERGENCY GLADHAND	EA	1
37	PAOZZ	7M245		BR-AI-310-210	NYLON AIR BRAKE TUBING ASS’Y, RED; RT4 VALVE TO HOSTLER VALVE	EA	1
38	PAOZZ	7M245	4720015293787	BR-AI-310-130	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS W/SLH TO SERVICE GLADHAND	EA	1
39	PAOZZ	7M245	4720015293792	BR-AI-310-140	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS W/SLH TO ABS VALVE (12 PORT) 24V	EA	1
40	PAOZZ	7M245		BR-AI-310-220	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS VALVE (12 PORT) 24V TO RT4 VALVE	EA	1
41	PAOZZ	7M245		BR-AI-310-230	NYLON AIR BRAKE TUBING ASS’Y, BLACK; AIR RESERVOIR TO HOSTLER VALVE	EA	1
42	PAOZZ	7M245		BR-AI-310-240	NYLONG AIR BRAKE TUBING ASS’Y, BLACK; AIR RESERVOIR TO RT4 VALVE	EA	1

Figure B-20. (2) ABS AIR BRAKE COMPONENTS



***Note: Items 17 thru 35 not shown on drawing.**

Figure B-20. (3) ABS AIR BRAKE COMPONENTS



***Note: Items 17 thru 35 not shown on drawing.**

Figure B-21. (1) SUSPENSION

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245			PEDESTAL ASSEMBLY	EA	2
2	PAOZZ	7M245		RG-AS-502-010	TRUNNION SHAFT ASSEMBLY	EA	1
3	PAOZZ	7M245		RG-AS-502-020	PEDESTAL FASTENER KIT	EA	2
4	PAOZZ	7M245		RG-AS-502-030	LOAD BEAM ASSEMBLY	EA	2
5	PAOZZ	7M245		RG-AS-502-040	AXLE SHOE ASSEMBLY	EA	4
6	PAOZZ	7M245		RG-AS-502-050	AXLE SHOE BUSHING KIT	EA	4
7	PAOZZ	7M245		RG-AS-502-060	AXLE SHOE ALIGNMENT PLATE	EA	8
8	PAOZZ	7M245		RG-AS-502-070	CENTER BUSHING KIT	EA	2
9	PAOZZ	7M245		RG-AS-502-000	SUSPENSION, COMPLETE	EA	1

Figure B-21. (2) SUSPENSION

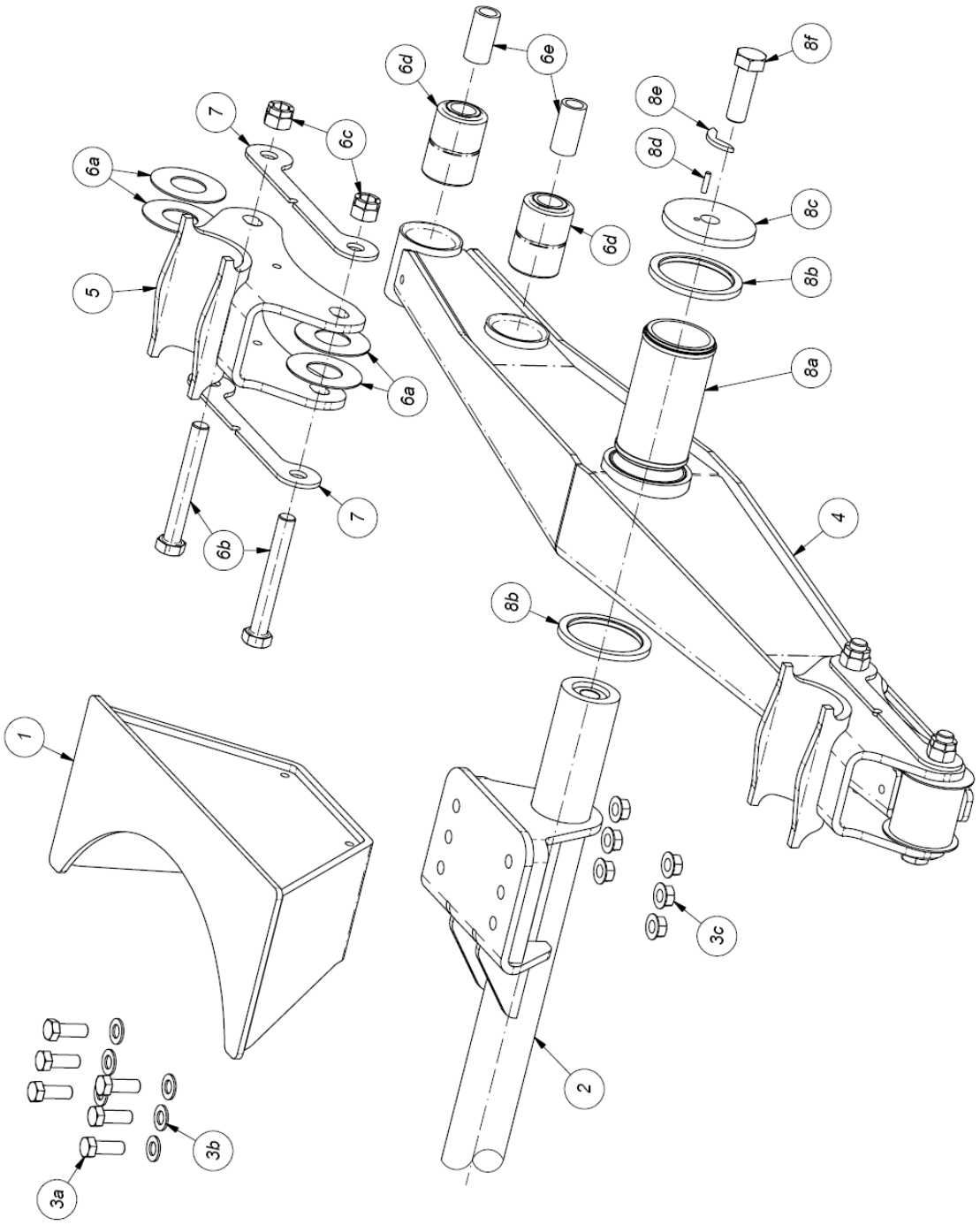


Figure B-22. AXLE BUMPER

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	5340015283413	AT-AA-500-010	RUBBER BUMPER	EA	4
2	PAOZZ	7M245	5306015282931	MI-BO-060-100	BOLT, 3/8” X 1” GRADE 5, HEX HEAD	EA	8
3	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	8

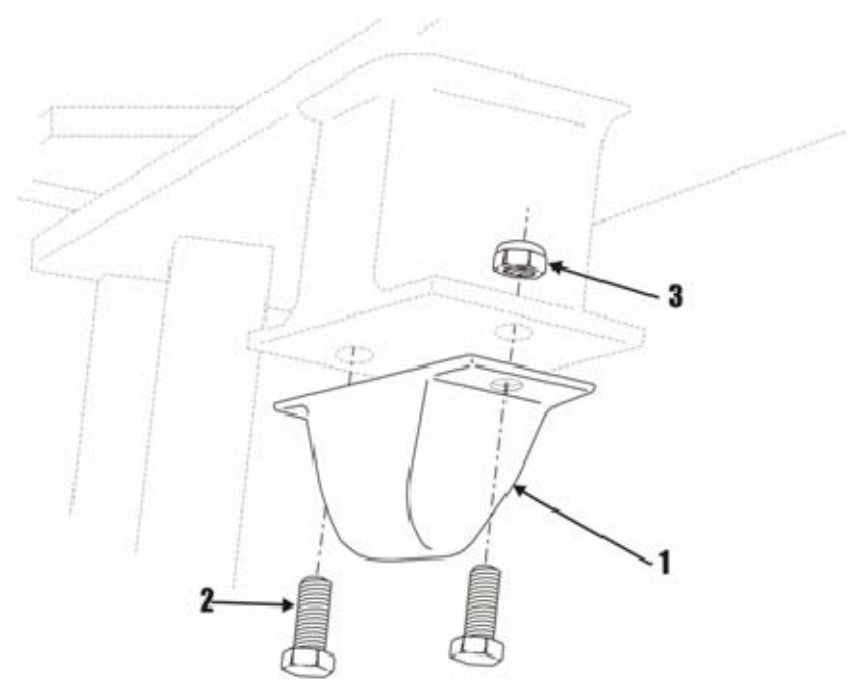
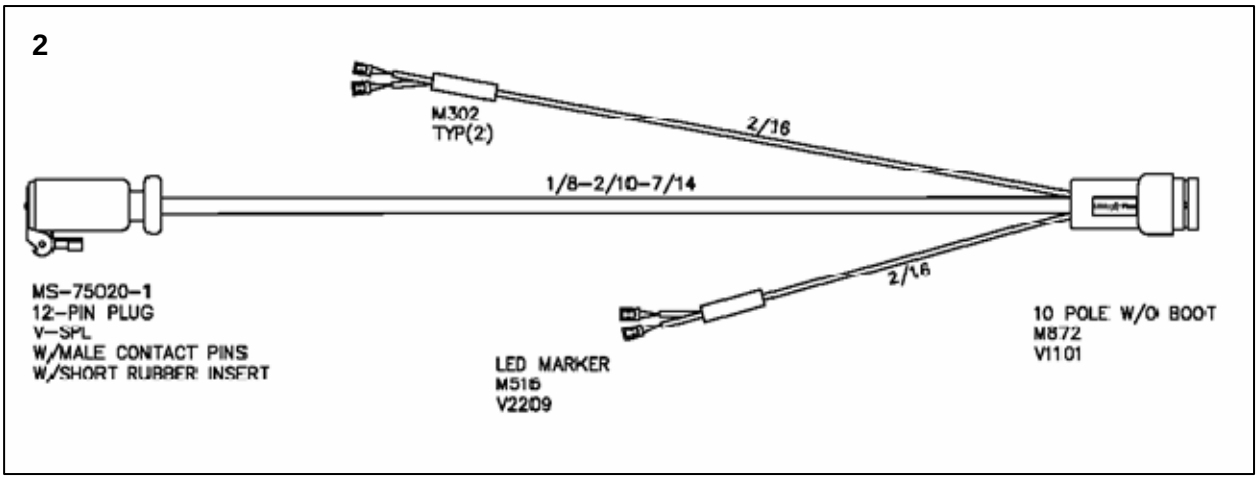


Figure B-23. (1) ELECTRICAL SYSTEM - WIRING

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	6150015283426	LT-WI-750-000	WIRING HARNESS, COMPLETE, FIVE PIECES, INCLUDES ABS LOOM (INCLUDES ITEMS 2-6)	EA	1
2	PAOZZ	7M245	6150015283437	LT-WI-750-100	WIRING HARNESS, NOSE END ONLY	EA	1
3	PAOZZ	7M245	6150015283464	LT-WI-750-200	WIRING HARNESS, MAIN TRUNK HARNESS ONLY	EA	1
4	PAOZZ	7M245	6150015283471	LT-WI-750-300	WIRING HARNESS, REAR SILL HARNESS	EA	1
5	PAOZZ	7M245	6150015283475	LT-WI-750-400	WIRING HARNESS, ABS LIGHT PIGTAIL	EA	1
6	PAOZZ	7M245	6150015283479	LT-WI-750-500	WIRING HARNESS, ABS LOOM	EA	1



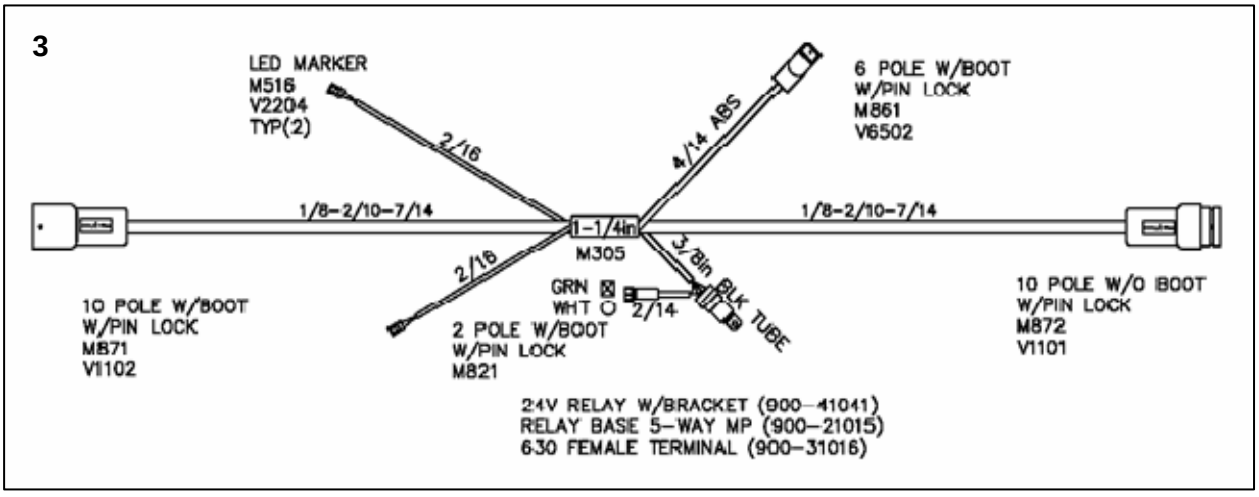
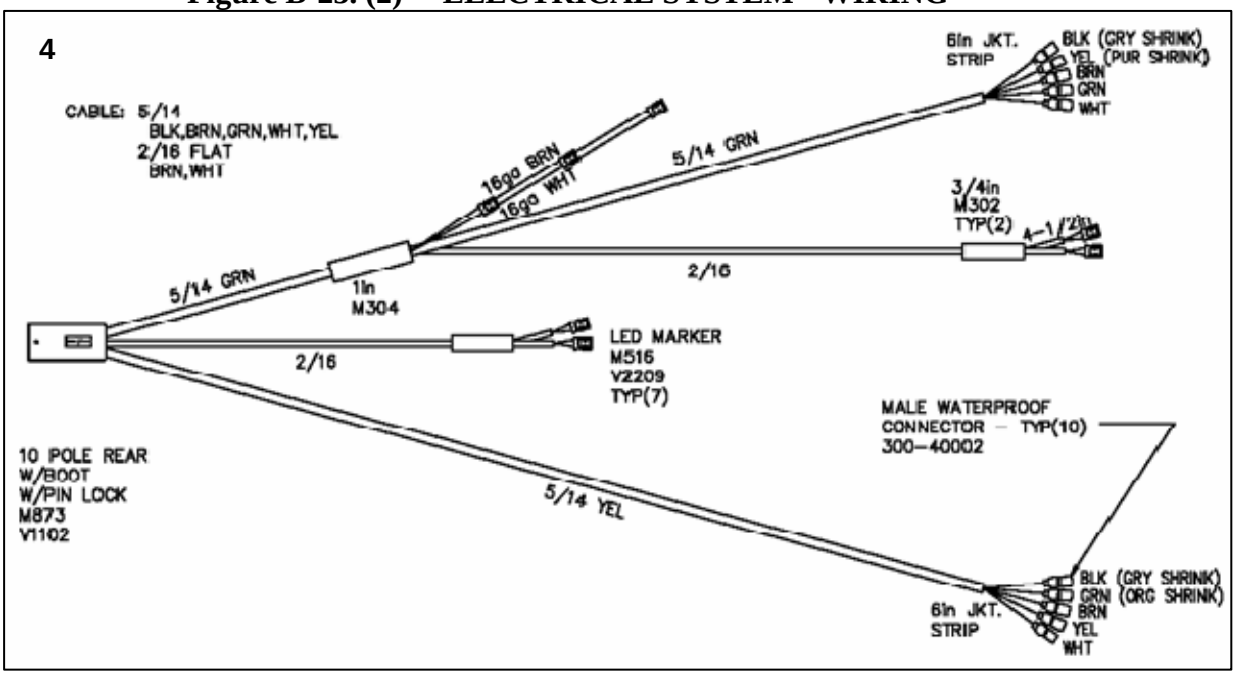
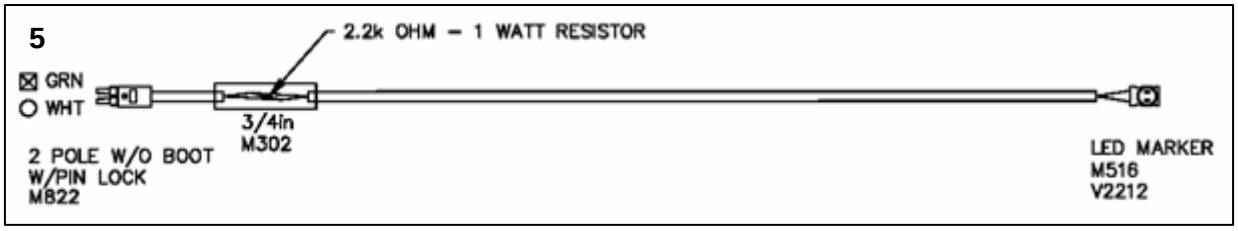


Figure B-23. (2) ELECTRICAL SYSTEM - WIRING





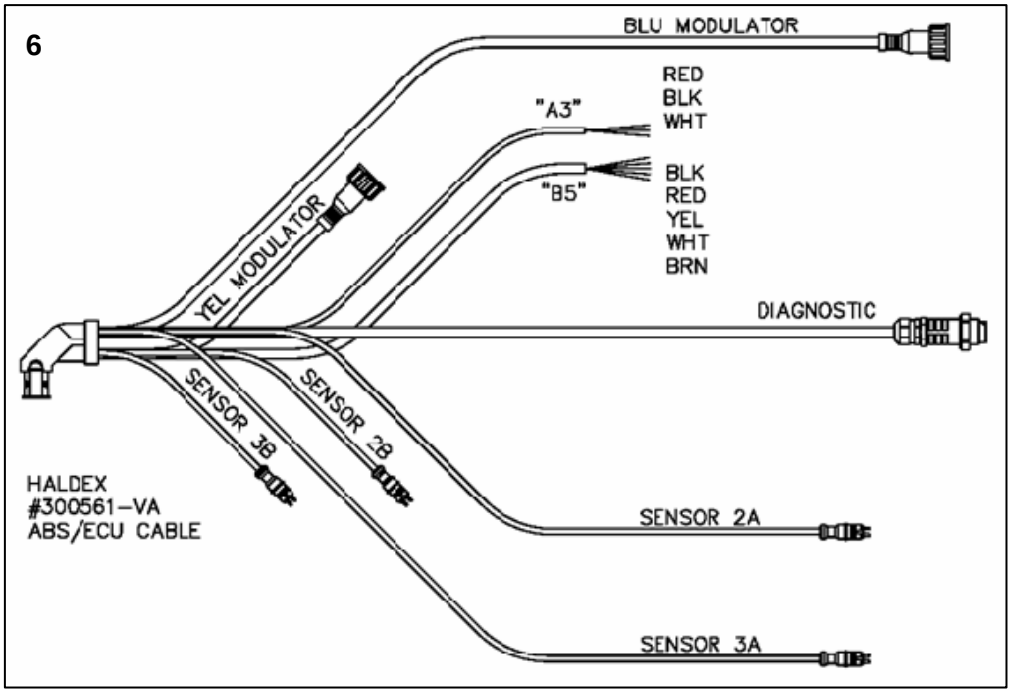


Figure B-24. ELECTRICAL SYSTEM – WIRING COMPONENTS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245	4730015291501	LT-WI-274-000	LOOM CLAMP #8, 1/2” ID VINYL COATED STEEL	EA	8
2	PAOZZ	7M245	4730015291503	LT-WI-276-000	LOOM CLAMP #12, 3/4” ID VINYL COATED STEEL	EA	17
3	PAOZZ	7M245	4730015291504	LT-WI-278-000	LOOM CLAMP #16, 1” ID VINYL COATED STEEL	EA	15
4	PAOZZ	7M245	5340015283598	MI-FA-050-100	NYLON TIE, 8” HD UV RESISTANT, BLACK	EA	52
5	PAOZZ	7M245	5320015283268	MI-FA-020-000	RIVETS, ALUMINUM HOUSING, STEEL PIN, 3/16” X 1/2”	EA	12
6	PAOZZ	7M245		MI-FA-020-010	RIVETS, ALUMINUM HOUSING, STEEL PIN, 3/16” X 5/8”	EA	16
7	PAOZZ	7M245	5325015292521	LT-WI-750-615	GROMMET, RUBBER, 7/8” ID X 1 1/4” GD X 3/16” GW	EA	16
8	PAOZZ	7M245		LT-LT-044-000	GROMMET, RUBBER, 2 1/2” ROUND	EA	1
9	PAOZZ	7M245	5305015293159	MI-BO-040-125	BOLT, 1/4” X 1 1/4" GRADE 5, HEX HEAD, PLATED	EA	30
10	PAOZZ	7M245	5310015282955	MI-BO-040-060	LOCKNUT, 1/4-20 W/ NYLON INSERT	EA	30
11	PAOZZ	7M245	5306015282931	MI-BO-060-100	BOLT, 3/8” X 1” GRADE 5, HEX HEAD	EA	4
12	PAOZZ	7M245	5310015293161	MI-BO-060-080	LOCK WASHER, 3/8”	EA	4
13	PAOZZ	7M245	4730015293165	LT-WI-750-616	SPLIT LOOM, 1/2” ID (16’ FOR TOTAL SYSTEM)	EA	1
14	PAOZZ	7M245	5340015293167	AT-AA-500-000	VIBRATION ISOLATOR, .63” EPDM RUBBER	EA	2

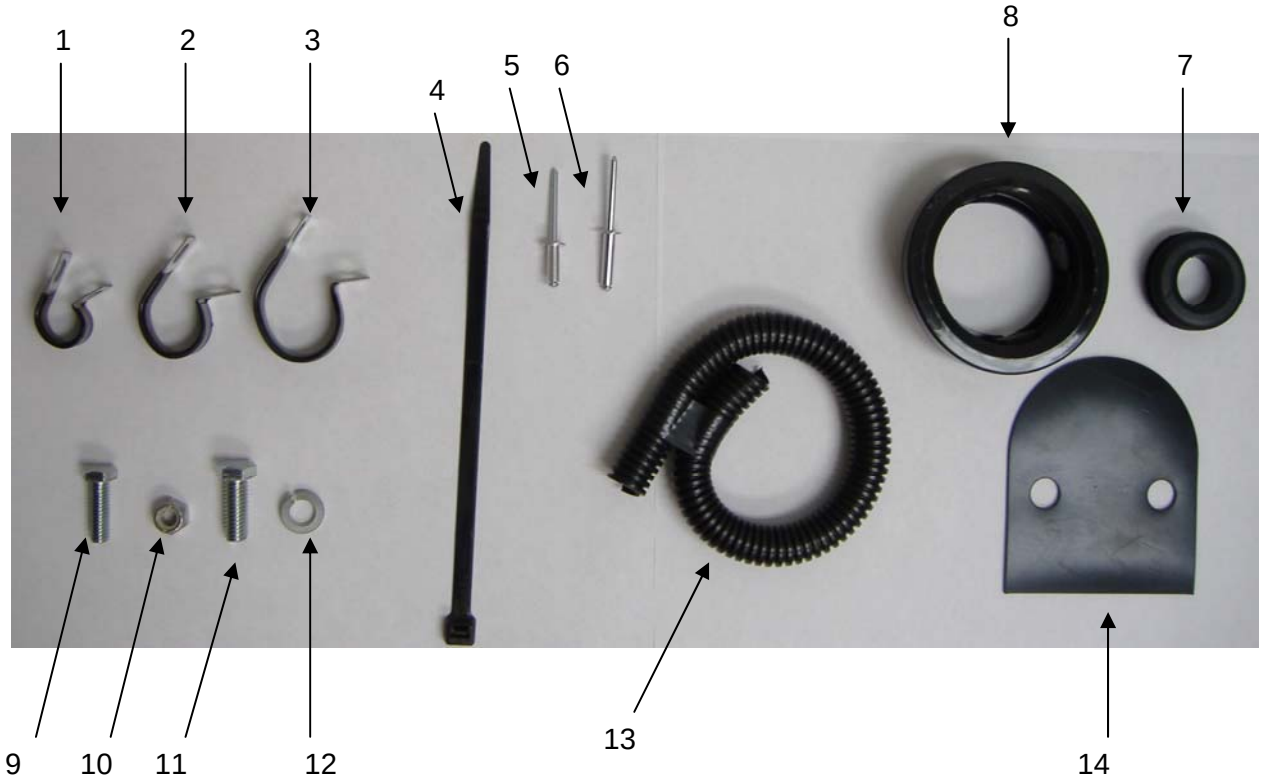


Figure B-25. ELECTRICAL SYSTEM - LIGHTS

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	13548	6220014826105	07411	LIGHT, L.E.D., STOP, TURN, TAIL, BLACKOUT, W/BUCKET	EA	2
2	PAOZZ	13548	6220014829850	07240	LIGHT, L.E.D., STOP, TURN, TAIL, BLACKOUT		
3	PAOZZ	13548	6220014825444	30255R	LIGHT, L.E.D., MARKER/CLEARANCE, RED, LAMP ONLY	EA	7
4	PAOZZ	13548	6220014825302	30255Y	LIGHT, L.E.D., MARKER/CLEARANCE, YELLOW, LAMP ONLY	EA	7
5	PAOZZ	13548	6220014826113	07406	LIGHT, L.E.D., MARKER/CLEARANCE, RED, LAMP W/BRACKET	EA	7
6	PAOZZ	13548	6220014825574	07407	LIGHT, L.E.D., MARKER/CLEARANCE, YELLOW, LAMP W/BRACKET	EA	7

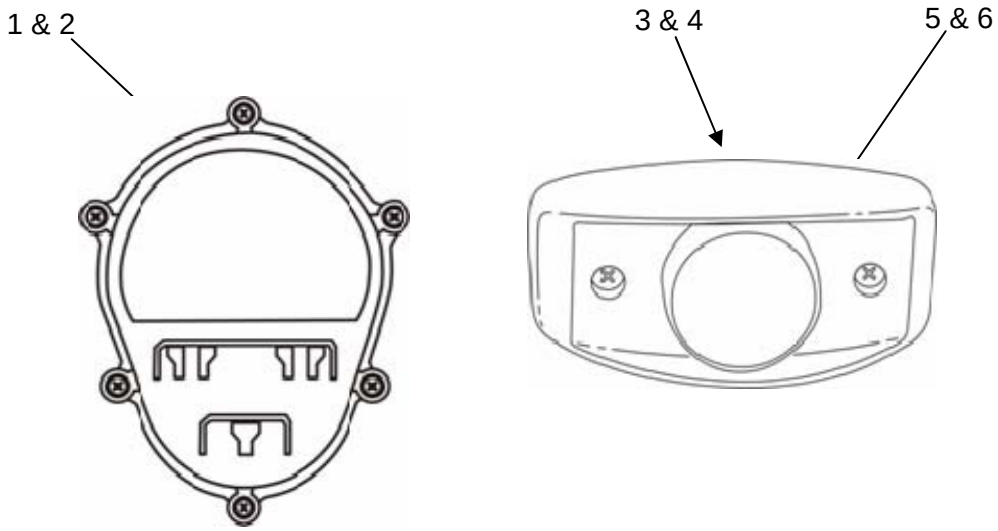
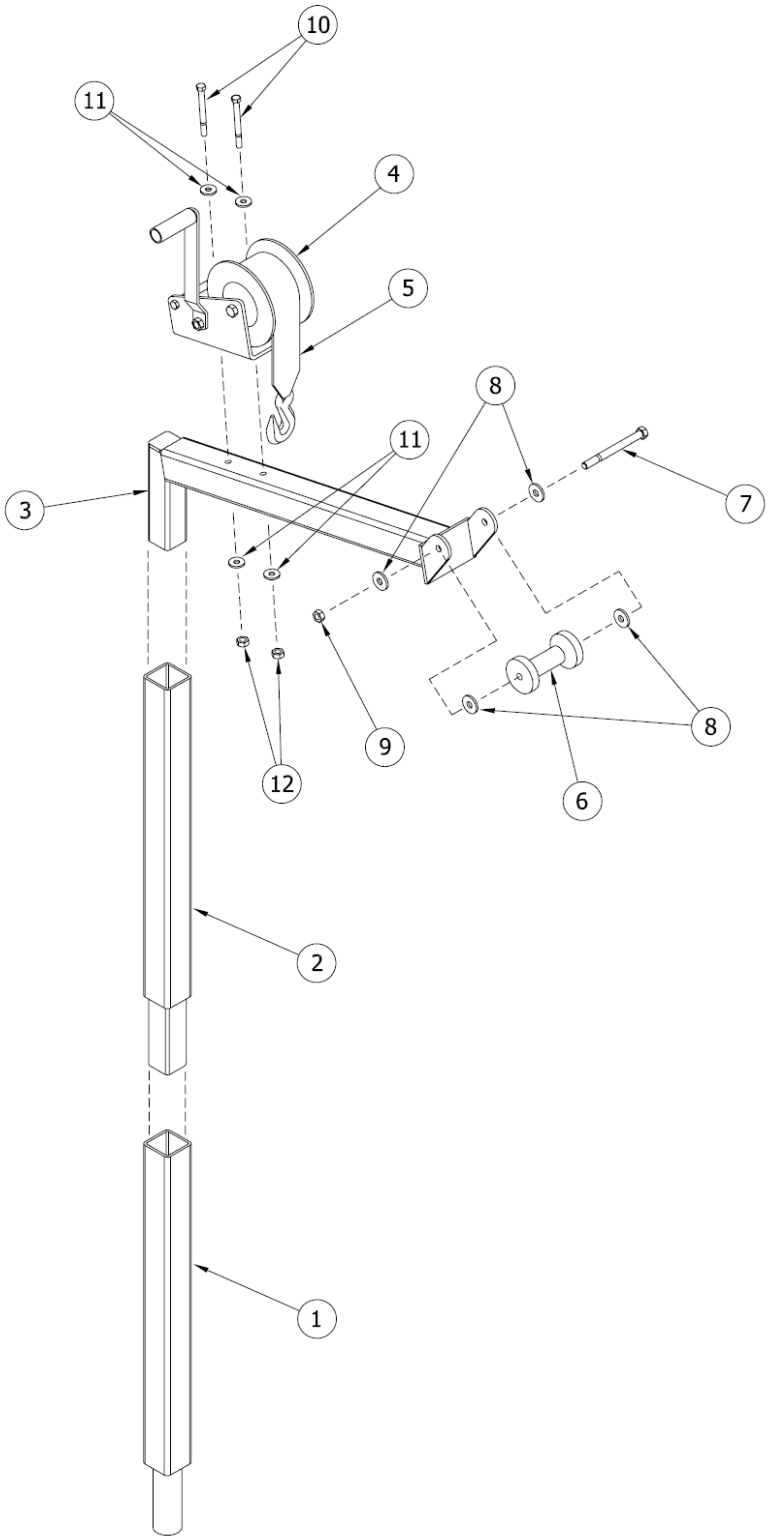


Figure B-26. (1) DAVIT POLE ASSEMBLY

ITEM NO.	SMR	CAGE	NSN	PART NUMBER	DESCRIPTION	U/I	QTY
1	PAOZZ	7M245		AT-AA-500-610	DAVIT POLE, LOWER VERTICAL ASSEMBLY	EA	1
2	PAOZZ	7M245		AT-AA-500-620	DAVIT POLE, MIDDLE VERTICAL ASSEMBLY	EA	1
3	PAOZZ	7M245		AT-AA-500-630	DAVIT POLE, ARM ASSEMBLY	EA	1
4	PAOZZ	7M245		AT-AA-500-020	WINCH, 1 SPEED, 2 WAY, 1400 LB. CAPACITY #5405	EA	1
5	PAOZZ	7M245		AT-AA-500-030	WINCH STRAP, 2" X 20' W/ STRAP HOOK #6030	EA	1
6	PAOZZ	7M245		AT-AA-500-040	RUBBER ROLLER, SPOOL TYPE, 4" WIDTH 5/8" HOLE #804	EA	1
7	PAOZZ	7M245		MI-BO-080-600	BOLT, 1/2" X 6" GRADE 5, HEX HEAD	EA	1
8	PAOZZ	7M245		MI-BO-080-050	FLAT WASHER, 1/2" SAE	EA	4
9	PAOZZ	7M245		MI-BO-080-060	LOCKNUT, 1/2" USS W/ NYLON INSERT	EA	1
10	PAOZZ	7M245		MI-BO-060-350	BOLT, 3/8" X 3 1/2" GRADE 5	EA	2
11	PAOZZ	7M245		MI-BO-060-099	FLATWASHER, 3/8" SAE	EA	4
12	PAOZZ	7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT	EA	2

Figure B-26. (2) DAVIT POLE ASSEMBLY



APPENDIX C
MANUFACTURER PART NUMBER INDEX

CAGE	NSN	PART NUMBER	DESCRIPTION
7M245	5310015282943	005-079-00	1/4" LOCK WASHER
7M245		005-096-00	1.5" X .120" WASHER
7M245		005-097-00	1.5" X .06" WASHER
7M245	5310015283257	005-098-00	SPINDLE INDEXING WASHER
7M245	5310015282977	005-099-00	SPINDLE TAG WASHER
7M245	5310015282962	005-100-00	LOCK WASHER
7M245		005-134-00	1.26" WASHER
7M245	5310015282937	006-099-00	1/4" HEX NUT
7M245	5310015283260	006-114-00	INNER SPINDLE NUT, 2.63"
7M245	5310015282976	006-115-00	OUTER SPINDLE NUT, 2.63"
7M245	5310015282969	006-118-00	M22 SWIVEL FLANGE NUT
7M245	5305015282576	007-139-00	1/4" CAP SCREW
7M245	5305015282720	007-157-00	CAP SCREW
7M245	5307015282935	007-194-00	M22 WHEEL STUD
7M245	5330015283269	010-052-00	GREASE SEAL FOR SPIDER, 1.5"
7M245	5330014084834	010-055-01	GREASE SEAL FOR HUB
7M245	3120014874955	014-056-00	SPIDER BUSHING
7M245		014-058-00	SUPPORT BUSHING
7M245		014-065-00	BRAKE SHOE ROLLER
7M245	2530015282442	021-046-00	GREASE CAP
7M245	3110015403474	031-026-01	INNER BEARING CUP
7M245		031-026-02	INNER BEARING CONE
7M245	3110015401373	031-027-01	OUTER BEARING CUP
7M245		031-027-02	OUTER BEARING CONE
7M245	3040015282535	034-032-00	RETAINER PLATE FOR CAMSHAFT SUPPORT BRACKET
7M245	2530015282431	034-058-01	AIR CHAMBER
7M245	2530015282425	034-192-03	LH CAMSHAFT, 23.44” LONG
7M245	2530015282429	034-193-03	RH CAMSHAFT, 23.44” LONG
7M245	5360015408104	046-096-00	SPRING, HELICAL EXTENSION
7M245	5360015070474	046-097-00	SPRING, HELICAL EXTENSION
7M245	2530015282460	055-040-08	ADUJUSTER , SLACK BRAKE
7M245	5340015283411	055-053-02	CLEVIS ROD END
7M245	5340015303623	055-054-00	CLEVIS ROD END
7M245	5315014874638	056-017-00	PIN, SHOULDER, HEADLESS
7M245	5315014874648	056-018-00	PIN, STRAIGHT HEADLESS
7M245		059-554-00	INSTRUCTION SHEET
7M245	4730015282570	061-006-00	GREASE FITTING 65°
7M245		069-020-00	1.50” SNAP RING
7M245		069-078-00	1.25” SNAP RING
7M245	5340015401257	071-122-00	RETAINER NUT AND BOLT
7M245	5330015283271	071-124-00	GASKET FOR GREASE CAP

CAGE	NSN	PART NUMBER	DESCRIPTION
13548	6220014829850	07240	LIGHT, L.E.D., STOP, TURN, TAIL, BLACKOUT
13548	6220014826113	07406	LIGHT, L.E.D., MARKER/CLEARANCE, RED, LAMP W/BRACKET
13548	6220014825574	07407	LIGHT, L.E.D., MARKER/CLEARANCE, YELLOW, LAMP W/BRACKET
13548	6220014826105	07411	LIGHT, L.E.D., STOP, TURN, TAIL, BLACKOUT, W/BUCKET
13548	6220014825444	30255R	LIGHT, L.E.D., MARKER/CLEARANCE, RED, LAMP ONLY
13548	6220014825302	30255Y	LIGHT, L.E.D., MARKER/CLEARANCE, YELLOW, LAMP ONLY
7M245		53254	TIRE
7M245	5315015283266	AT-AA-015-000	RETAINER PIN, 1/8”
7M245	5340015283392	AT-AA-250-000	SPRINGS, 9/16” WIRE
7M245		AT-AA-300-144	DATA PLATE: IDENTIFICATION
7M245		AT-AA-300-145	DATA PLATE: WEIGHT AND DIMENSIONAL
7M245		AT-AA-340-010	CHOCK BLOCKS WITH LANYARD
7M245	5340015293167	AT-AA-500-000	VIBRATION ISOLATOR, .63” EPDM RUBBER
7M245	5340015283413	AT-AA-500-010	RUBBER BUMPER
7M245		AT-AA-500-020	WINCH, 1 SPEED, 2 WAY, 1400 LB. CAPACITY #5405
7M245		AT-AA-500-030	WINCH STRAP, 2" X 20' W/ STRAP HOOK #6030
7M245		AT-AA-500-040	RUBBER ROLLER, SPOOL TYPE, 4" WIDTH 5/8" HOLE #804
7M245	2540015282526	AT-AA-500-210	MUD FLAP, ONE EACH
7M245	5340015283541	AT-AA-500-250	MUD FLAP ROLL UP RUBBER RESTRAINT CORD W/ S HOOK, ONE EACH
7M245	5306015282919	AT-AA-500-280	WING BOLT
7M245	5340015283403	AT-AA-500-290	SPARE TIRE BRACE
7M245	5340015283273	AT-AA-500-300	DROP LEG EXTENSION, 2 ½” SQ. TUBE
7M245	5340015283275	AT-AA-500-310	90 DEG DROP LEG, 3” SQ. TUBE
7M245	5315015283263	AT-AA-500-320	LOCK PIN, W/ RESTRAINT CHAIN
7M245	5340015700372	AT-AA-500-330	HOLD DOWN BAR W/CHAIN
7M245		AT-AA-500-521	RAMP, COMPLETE L HAND
7M245		AT-AA-500-522	RAMP, COMPLETE R HAND
7M245		AT-AA-500-610	DAVIT POLE, LOWER VERTICAL ASSEMBLY
7M245		AT-AA-500-620	DAVIT POLE, MIDDLE VERTICAL ASSEMBLY
7M245		AT-AA-500-630	DAVIT POLE, ARM ASSEMBLY
7M245		AT-AA-750-200	DRAWBAR TOOL BOX HINGE
7M245		AT-AA-750-200	BEAVERTAIL TOOL BOX HINGE
7M245	4010015282560	AT-CH-188-100	RESTRAINT CHAIN, TRAILER LIFT COVER
7M245	4010015282564	AT-CH-188-110	RESTRAINT CHAIN W/SNAP LINK
7M245	4010015282561	AT-CH-375-100	RAMP RESTRAINT CHAIN (LOWER)
7M245	4010015282566	AT-CH-375-110	RAMP RESTRAINT CHAIN (UPPER)
7M245	4030015282567	AT-CH-500-030	LATCH SAFETY HOOK (INCLUDES ITEMS 4-9)
7M245	4030015282569	AT-CH-500-035	PARTS KIT, HOOK (INCLUDES ITEMS 7-9)
7M245	4910015699455	AT-CH-500-040	SAFETY CHAIN REPLACEMENT KIT, COMPLETE W/HOOK, AND CHAIN (INCLUDES ITEMS 4-11)
7M245	5340015282380	AT-CH-888-040	LOAD BINDER, RATCHET
7M245	5340015282524	AT-CO-005-000	LUNETTE EYE KIT (INCLUDES ITEM 2)
7M245	5325015699530	AT-CO-005-100	LUNETTE FASTENER KIT (INCLUDES 4 BOLTS AND 4 NUTS)

CAGE	NSN	PART NUMBER	DESCRIPTION
7M245	4910015283664	AT-LG-500-100	JACK, ROADSIDE
7M245	4910015283654	AT-LG-500-200	JACK, CURBSIDE
7M245	5340015284267	AT-LG-500-300	DROP LEGS
7M245	5315015284041	AT-LG-500-305	HANDLE RETAINER COTTER PIN, W/ LANYARD
7M245	3040015283682	AT-LG-500-310	CROSS SHAFT, JACK
7M245	4730015284269	AT-LG-500-315	GREASE FITTING
7M245	3040015283683	AT-LG-500-320	EXTENSION CROSS SHAFT, CRANK HANDLE
7M245	5340015699472	AT-LG-500-330	TRAILER BRACKETS, MOUNTING SET
7M245		AT-LG-500-340	JACKPLATE, MOUNTING SET
7M245	5340015303632	AT-LG-500-400	CRANK HANDLE
7M245	5340015283677	AT-LG-500-410	HANDLE RETAINER BRACKET
7M245	5340015293192	BF-AI-302-100	DUMMY GLADHAND W/ CABLE
7M245	5340015283563	BR-AB-200-020	ABS SENSOR CLIP
7M245	5930015282423	BR-AB-200-060	ABS BLOCK, SENSOR
7M245	2530015282514	BR-AB-500-100	VALVE, MOD2 ABS W/SLH
7M245	4810015282572	BR-AB-500-110	ABS VALVE (12 PORT) 24V
7M245	2530015282512	BR-AB-500-120	SPRING BRAKE VALVE, RT4
7M245	2815015284263	BR-AB-500-130	VALVE, HOSTLER
7M245	5930015282418	BR-AB-500-140	ABS SENSOR
7M245	2530015282521	BR-AF-040-454	VALVE, DRAIN PETCOCK
7M245	4730015293767	BR-AF-060-109	PLUG, 3/8” BLACK PIPE
7M245	4730015293772	BR-AF-080-008	PLUG, 1/2” BLACK PIPE
7M245	5365015293212	BR-AF-080-060	BUSHING HEX 1/2”-3/8” NPT
7M245		BR-AF-080-200	NIPPLE 1/2” EH X CLOSE
7M245	4730015293773	BR-AF-300-080	FRAME NIPPLE, 3/8” FNPT X 1/2” NAB
7M245	5340015283551	BR-AF-301-000	GLADHAND SERVICE/CONTROL
7M245	5340015283554	BR-AF-302-000	GLADHAND EMERGENCY/SUPPLY
7M245		BR-AI-303-060	REMOTE PETCOCK CABLE SLEEVE
7M245	4720015293175	BR-AI-306-036	AIR HOSE 36” SWIVEL ASS’Y, 3/8” ID
7M245	4720015293170	BR-AI-306-060	AIR HOSE 60” SWIVEL ASS’Y, 3/8” ID
7M245	4720015293787	BR-AI-310-130	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS W/SLH TO SERVICE GLADHAND
7M245	4720015293792	BR-AI-310-140	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS W/SLH TO ABS VALVE (12 PORT) 24V
7M245		BR-AI-310-200	NYLON AIR BRAKE TUBING ASS’Y, RED; HOSTLER VALVE TO EMERGENCY GLADHAND
7M245		BR-AI-310-210	NYLON AIR BRAKE TUBING ASS’Y, RED; RT4 VALVE TO HOSTLER VALVE
7M245		BR-AI-310-220	NYLON AIR BRAKE TUBING ASS’Y, BLUE; ABS VALVE (12 PORT) 24V TO RT4 VALVE
7M245		BR-AI-310-230	NYLON AIR BRAKE TUBING ASS’Y, BLACK; AIR RESERVOIR TO HOSTLER VALVE
7M245		BR-AI-310-240	NYLONG AIR BRAKE TUBING ASS’Y, BLACK; AIR RESERVOIR TO RT4 VALVE
7M245	2590015293781	BR-AI-601-200	RUBBER PAD FOR AIR TANK
7M245	2530015282516	BR-AI-601-400	AIR RESERVOIR, 2800 CU. IN
7M245	2530015282493	BR-AI-606-100	SPRING BRAKE CHAMBER
94658	5340014993719	F133-2-1	CARGO TIE DOWNS (D-LINK ASSY)
7M245		FA-PL-280-210	REAR TRAILER TIE DOWN
7M245		FA-PL-280-210	SUPPLEMENTAL TIE DOWN

CAGE	NSN	PART NUMBER	DESCRIPTION
7M245	4730015293208	HY-FT-060-100	90° STREET ELBOW, 3/8” MNPT X 3/8” FNPT
7M245	2530015282400	K71-135-00	CAMSHAFT REPAIR KIT
7M245	2530015398697	K71-136-00	BRAKE SHOE AP KIT
7M245		LT-LT-044-000	GROMMET, RUBBER, 2 1/2” ROUND
7M245	4730015291501	LT-WI-274-000	LOOM CLAMP #8, 1/2” ID VINYL COATED STEEL
7M245	4730015291503	LT-WI-276-000	LOOM CLAMP #12, 3/4” ID VINYL COATED STEEL
7M245	4730015291504	LT-WI-278-000	LOOM CLAMP #16, 1” ID VINYL COATED STEEL
7M245	6150015283426	LT-WI-750-000	WIRING HARNESS, COMPLETE, FIVE PIECES, INCLUDES ABS LOOM (INCLUDES ITEMS 2-6)
7M245	6150015283437	LT-WI-750-100	WIRING HARNESS, NOSE END ONLY
7M245	6150015283464	LT-WI-750-200	WIRING HARNESS, MAIN TRUNK HARNESS ONLY
7M245	6150015283471	LT-WI-750-300	WIRING HARNESS, REAR SILL HARNESS
7M245	6150015283475	LT-WI-750-400	WIRING HARNESS, ABS LIGHT PIGTAIL
7M245	6150015283479	LT-WI-750-500	WIRING HARNESS, ABS LOOM
7M245	4730015293195	LT-WI-750-604	SPLIT LOOM, 1/2” ID (4’ FOR TOTAL SYSTEM
7M245	5325015292521	LT-WI-750-615	GROMMET, RUBBER, 7/8” ID X 1 1/4” GD X 3/16” GW
7M245	4730015293165	LT-WI-750-616	SPLIT LOOM, 1/2” ID (16’ FOR TOTAL SYSTEM)
7M245	5510015283418	LU-BO-010-000	OAK, 5 ¾” X 9’ 10 1/8”, TREATED
7M245	5305015282717	LU-SC-516-250	FLOOR SCREW, 5/16” TOR X 40 HEAD X 3
7M245		MI-BO-040-030	1/4” FLAT WASHER, SAE
7M245	5310015282955	MI-BO-040-060	LOCKNUT, 1/4-20 W/ NYLON INSERT
7M245	5306015282926	MI-BO-040-110	BOLT. HHCS, 1/4” X 1”, GRADE 5, COURSE THREAD
7M245	5305015293159	MI-BO-040-125	BOLT, 1/4” X 1 1/4” GRADE 5, HEX HEAD, PLATED
7M245		MI-BO-040-175	BOLTS, 1/4”-20 X 1 3/4”, GRADE 5
7M245	5310015282947	MI-BO-060-050	LOCKNUT, 3/8”-16 W/ NYLON INSERT
7M245	5310015282952	MI-BO-060-060	3/8” FLAT WASHER, USS, PLATED
7M245	5310015293161	MI-BO-060-080	LOCK WASHER, 3/8”
7M245		MI-BO-060-099	FLATWASHER, 3/8" SAE
7M245	5306015282931	MI-BO-060-100	BOLT, 3/8” X 1” GRADE 5, HEX HEAD
7M245	5306015282924	MI-BO-060-150	BOLT. 3/8” X 1 1/2”, GR5, HHCS, ZINC PLATED
7M245	5306015282916	MI-BO-060-301	BOLT, HHCS, 3/8” X 3”, TAP BOLT, GRADE 5, COURSE THREAD
7M245		MI-BO-060-350	BOLT, 3/8" X 3 1/2" GRADE 5
7M245		MI-BO-080-050	FLAT WASHER, 1/2" SAE
7M245		MI-BO-080-060	LOCKNUT, 1/2" USS W/ NYLON INSERT
7M245		MI-BO-080-600	BOLT, 1/2" X 6" GRADE 5, HEX HEAD
7M245	5310015283670	MI-BO-100-070	NUTS, 5/8-11, NYLON LOCKING
7M245	5306015282932	MI-BO-100-150	BOLTS, 5/8-11, 1 1/2", GR 5
7M245	5320015283268	MI-FA-020-000	RIVETS, ALUMINUM HOUSING, STEEL PIN, 3/16” X 1/2”
7M245		MI-FA-020-010	RIVETS, ALUMINUM HOUSING, STEEL PIN, 3/16” X 5/8”
7M245	5340015283598	MI-FA-050-100	NYLON TIE, 8” HD UV RESISTANT, BLACK
7M245	5340015293187	MI-FA-080-000	NYLON TIE, NATURAL, 21” LONG, HEAVY DUTY
7M245		RG-AA-500-000	AXLE, COMPLETE W HUB AND DRUMS
7M245	2530015282437	RG-AA-500-510	AXLE, BEAM ONLY, W/ BRAKE CAMS
7M245		RG-AB-165-702	BRAKE SHOE SET W/ AP KIT
7M245	2530015282486	RG-AB-712-030	AUTOMATIC SLACK ADJUSTER

CAGE	NSN	PART NUMBER	DESCRIPTION
7M245		RG-AB-712-090	AUTOMATIC SLACK ADJUSTER, SERVICE REPAIR KIT (INCLUDES ITEMS 2-4)
7M245	3120015282538	RG-AH-100-000	PARTS KIT, BEARING REPLACEMENT KIT (PER WHEEL, INCLUDES ITEMS 2-10)
7M245		RG-AH-998-244	HUB & DRUM ASS'Y, 10-11.25 IN., CUPS & STUDS
7M245		RG-AH-999-059	LUG NUTS
7M245		RG-AS-502-000	SUSPENSION, COMPLETE
7M245		RG-AS-502-010	TRUNNION SHAFT ASSEMBLY
7M245		RG-AS-502-020	PEDESTAL FASTENER KIT
7M245		RG-AS-502-030	LOAD BEAM ASSEMBLY
7M245		RG-AS-502-040	AXLE SHOE ASSEMBLY
7M245		RG-AS-502-050	AXLE SHOE BUSHING KIT
7M245		RG-AS-502-060	AXLE SHOE ALIGNMENT PLATE
7M245		RG-AS-502-070	CENTER BUSHING KIT
7M245		RG-AT-200-500	VALVE STEM
7M245		RG-AW-298-050	WHEEL, COMPLETE
7M245		SEE FIGURE B-15	ABS EXCITER (PART OF HUB ASSY)
7M245	5340015283536	ST-HR-040-100	BEAVERTAIL TOOL BOX HANDLE
7M245	5340015283396	ST-HR-200-100	RAMP HINGE PIN
7M145	5340015283374	ST-PL-100-130	FRONT TRAILER LIFT LUG
7M245	5340015283376	ST-PL-100-140	REAR TRAILER LIFT LUG
7M245	3990015282546	ST-PL-125-100	FRONT TRAILER TIE DOWN
7M245	5340015283408	ST-PL-135-000	MUD FLAP ROLL UP BRACKET, ONE EACH
7M245	5340015283406	ST-PL-135-070	MUD FLAP CLAMP BRACKET, ONE EACH
7M245		ST-PL-135-110	DRAWBAR TOOL BOX COVER
7M245	5340015283401	ST-PL-250-140	RAMP LIFTING BRACKET
7M245		ST-PL-250-150	BEAVERTAIL TOOL BOX COVER
7M245	5340015283497	ST-PL-500-100	RAMP HINGE
7M245		ST-PL-500-110	RAMP HINGE PIN SUPPORT EYE ASSY
7M245	5340015283639	ST-TP-250-100	TRAILER LIFT COVER

APPENDIX D
PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

D-1. INTRODUCTION

a. Table D-l contains PMCS for Operators (first LOM), which is the responsibility of the trailer operator. Operator PMCS includes adjustments, minor repairs, testing, and part replacements and is required to maintain the trailer in proper operating condition. The following applies to the conduct of PMCS:

(1) Maintain the trailer in a serviceable and operational condition.

(2) When operating the trailer, perform PMCS per the scheduled intervals in the checklist. The following intervals apply: B-Before, D-During, A-After, and W-Weekly.

(3) Observe all CAUTIONS and WARNINGS. Allow hot parts time to cool when performing PMCS after operation.

(4) Perform all checks according to the TM. If an item is not operational, use the troubleshooting section to determine if the operator can repair it, or if it should be reported to maintenance.

b. Table D-2 contains PMCS for Maintainers (second LOM). Maintainer PMCS involves semi-annual and annual services. In addition to the specific items in the Maintainer PMCS, all Operator PMCS should be performed during services.

D-2. GENERAL INFORMATION

The following guidelines are provided for use during PMCS:

a. Nuts, Bolts, Screws. Check for looseness. Look for chipped paint, which may indicate parts that have moved. Check for loose assemblies by gently shaking them. Check for missing fasteners. Replace missing fasteners and tighten all loose connections.

b. Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If a bad weld is found, report it to maintenance.

c. Electrical Leads and Connectors. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure all wires are in good condition.

d. Hoses and Tubes. Look for wear, damage, and leaks. Tighten all clamps and fittings. Report broken or worn parts to maintenance.

e. Rust and Corrosion. Check for rust and corrosion on parts that are painted or plated to resist corrosion. Check for dirt and salt build-up and clean parts thoroughly if found. Paint bare, exposed metal on the trailer. Remove rust and corrosion before painting.

D-3. OPERATOR PREVENTATIVE MAINTENANCE CHECKS AND SERVICES

The checks listed in Table D-l are to be performed by the operator prior to operation of the trailer and at prescribed intervals.

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
DRAWBAR AREA						
1					**LUNETTE**	
	X			X	Inspect lunette for cracks, damage, or excessive wear.	Excessive wear, cracks, or damage.
	X			X	Inspect lunette plate for cracks, damage, or excessive wear.	
	X			X	Inspect lunette bolts for cracks, damage, or excessive wear.	
2					**SAFETY CHAIN**	
	X			X	Inspect safety chain for cracks, damage, or excessive wear.	Excessive wear, cracks, or damage.
3					**PRIME MOVER CONNECTORS**	
	X		X	X	Check gladhands for damage.	Gladhands, air hoses, or electrical connector are missing or damaged.
	X		X	X	Visually inspect gladhand screens for damage.	
	X		X	X	Check gladhand seals for wear, damage, or dry rot.	
	X		X	X	Check air hoses for cuts and breaks.	
	X		X	X	Electrical connector is not damaged.	
4					**TOOLBOX**	
	X			X	Check drawbar toolbox cover for proper operation and serviceability.	

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
	X			X	Check drawbar toolbox for water.	
5					**LANDING LEGS**	
	X			X	Check bolts for damaged or missing parts.	Missing or broke.
	X			X	Inspect 2-speed Gearbox for damage.	Gearbox inoperable.
	X			X	Inspect Crank Handle Assembly for damage.	Handle missing or broke.
	X			X	Inspect Drop Leg Assemblies for damage.	Drop legs bent or damaged.
	X			X	Inspect Crank Handle Assembly Restraint Pin and Lanyard for proper operation and storage.	
					CHASSIS	
6					**TRAILER FRAME**	
	X			X	Visually inspect frame for cracks or other structural damage.	Excessive wear, cracks, or damage.
7					**DECK BOARDS**	
	X			X	Inspect for damaged or broken boards.	
	X			X	Check for missing, damaged, or loose screws.	
8					**TIE DOWN POINTS**	
	X			X	Check 26 Cargo Tie Downs (D-rings), and 4 ISO twist locks for serviceability.	Tie down points, ratchet load binders, or chains not sufficient for proper securing of payload.
	X			X	Check five chains, five load binders, and	

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
					other tie downs for serviceability and proper quantity.	
	X			X	Inspect Trailer Lifts and Trailer Tie Downs.	
	X			X	Inspect Trailer Lifts Covers and chains on trailer deck.	
9					**SUSPENSION**	
	X			X	Check for damaged leaf springs.	Any components are damaged or unserviceable.
	X			X	Inspect suspension and related hardware for serviceability.	
10					**BRAKES**	
	X		X	X	Check for leaks in the air brake system by shutting off the engine of the prime mover when air pressure is at maximum. Observe air pressure gage for 1 minute. Note any drop in air pressure.	Any leaks are evident.
	X		X	X	Have an assistant actuate the service brakes. Listen for air leaks at the gladhands, relay valve, and air reservoirs.	Trailer brakes fail to hold or air leaks are found.
	X		X	X	Actuate trailer brakes and check that brakes at all four wheel positions lock.	Trailer brakes inoperative.
11					**HUBS**	

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
					WARNING **BEFORE PUTTING HAND TO HUB, HOLD HAND CLOSE TO HUB TO CHECK FOR EXCESSIVE HEAT RADIATION. HUB MAY BE HOT. THIS WILL PREVENT SKIN BURNS CAUSED BY HOT METAL.**	
		X	X		Check outer wheel hubs immediately after road use.	Excessive heat, indicating worn wheel bearing.
		X	X		Feel hubs for significant temperature variation.	
	X		X	X	Check hubs for discoloration or blistered paint that may indicate excessive heat condition.	
12					**WHEELS**	
	X		X	X	Check wheels for damage.	Any wheel is damaged or unserviceable.
	X		X	X	Check for debris or foreign objects lodged between wheels.	
	X		X	X	Check lug nuts for tightness and ensure all lug nuts are installed.	Any lug nuts are missing.
13					**TIRES**	
	X			X	Check tire pressure (75 psi (cold)) when tires are cool.	Any tire is flat, missing, or

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
	X		X	X	Check tires for gouges, cracks, tread separation, and foreign objects lodged in tread or tire.	unserviceable.
				X	Check tire tread.	Excessive or unusual wear.
	X			X	Check spare tire assembly.	
14					**AIR SYSTEM**	
	X			X	Check for leaks in air reservoir.	Any leaks are evident.
			X		Pull the air drain lanyard and completely drain air system.	Inoperative or leaking drain control.
	X				Release the air drain lanyard and fill air system.	
	X			X	Check for free movement of air hose connection. Check for dirt in connector.	
	X	X	X	X	Check air hoses for cuts and breaks.	Air hoses are missing or damaged.
15					**LIGHTS**	
	X		X	X	Visually inspect for damaged parts or components.	Inoperative brake or tail light.
	X		X	X	Check all brake/tail/blackout and clearance lights for proper operation and cleanliness.	
16					**DATA PLATES AND STENCILS**	
				X	Inspect the Information Plate, CG Plate, and Hostler Valve Plate.	
				X	Inspect the following stencils: CARC, LIFT, TP 75, AIR DRAIN, ABS, TIE	

Table D-l. Organizational Preventative Maintenance Checks and Services

ITEM	INTERVAL				ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	B	D	A	W		
					DOWN.	
BEAVERTAIL AREA						
17					**RAMPS**	
	X			X	Inspect ramp hinge pin and hinge spring rub plate.	
	X		X	X	Inspect ramp restraint chains and ratchet binders.	
18					**TOOLBOX**	
	X			X	Check beavertail toolbox cover for proper operation and serviceability.	
	X			X	Check beavertail toolbox for water.	
19					**STABLIZER LEGS**	
	X		X	X	Check Stabilizer Legs for missing parts or damage	Any damage not serviceable.
	X		X	X	Check to ensure proper stowage.	
20					**BEAVERTAIL**	
	X			X	Check for missing parts or damaged beavertail cleats.	Any damage not serviceable.
	X			X	Inspect beavertail bucket rest plate.	

D-4. INTERMEDIATE PREVENTATIVE MAINTENANCE CHECKS AND SERVICES

During the Semi Annual (SA)/Annual (A) services, ensure that the preventative maintenance checks and services in Table D-l are performed in conjunction with these services.

Table D-2. Intermediate Level Preventative Maintenance Checks and Services

ITEM	Interval		ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	SA	A		
1			**TIRES**	
	X	X	Measure tread depth. Measurements should be taken at random locations on the tire.	Tread depth is less than 1/16 inches.
2			**BRAKES**	
	X	X	Check for proper operation.	Failure to operate properly or out of adjustment.
		X	Check for proper adjustment.	
3			**BRAKE LININGS**	
	X	X	Check brake linings for sufficient material.	Excessive wear.
	X	X	Check brake linings for damage.	Excessive damage.
	X	X	Check brake components for damaged, missing, or unserviceable components.	Damaged or missing components.
4			**BRAKE DRUMS**	
	X	X	Visually inspect brake drums for cracks, scoring, gouging, or abnormal wear.	Measure brake drums to check for excessive wear.
	X	X	Excessive wear, cracks, or damage.	
5			**WHEEL BEARINGS**	
	X	X	Remove wheel bearings and visually inspect for wear or damage. Clean and repack.	Excessive wear or damage.
	X	X	Visually inspect bearing seat for wear or damage.	

Table D-2. Intermediate Level Preventative Maintenance Checks and Services

ITEM	Interval		ITEM TO BE INSPECTED	TRAILER NOT AVAILABLE IF:
	SA	A		
6			**TRAILER**	
	X	X	Re-torque all nuts, bolts and connectors.	
	X	X	Check trailer for cracks, dents and damage.	Significant damage to frame.

APPENDIX E
LUBRICATION ORDER

E-1. LUBRICATION ORDER

a. General. This appendix lists the lubrication points for the MTO20A1 EET.

b. Use. The lubrication order can be laminated for quick reference use.

THIS PAGE INTENTIONALLY LEFT BLANK

LUBRICATION ORDER

JANUARY 2010

ENGINEER EQUIPMENT TRAILER (EET), MODEL MTO20A1 (NSN: 2330-01-518-3809)

REFERENCE TM 11026A-OI

Intervals and the related man-hour times are based on normal operation. The man-hour time specified is the time you need to do all the services prescribed for a particular interval. Change the interval if your lubricants are contaminated or if you are operating equipment under adverse conditions, including the longer-than-usual operation hours. You may extend the adequate preservation precautions. Clean fittings before lubrication.

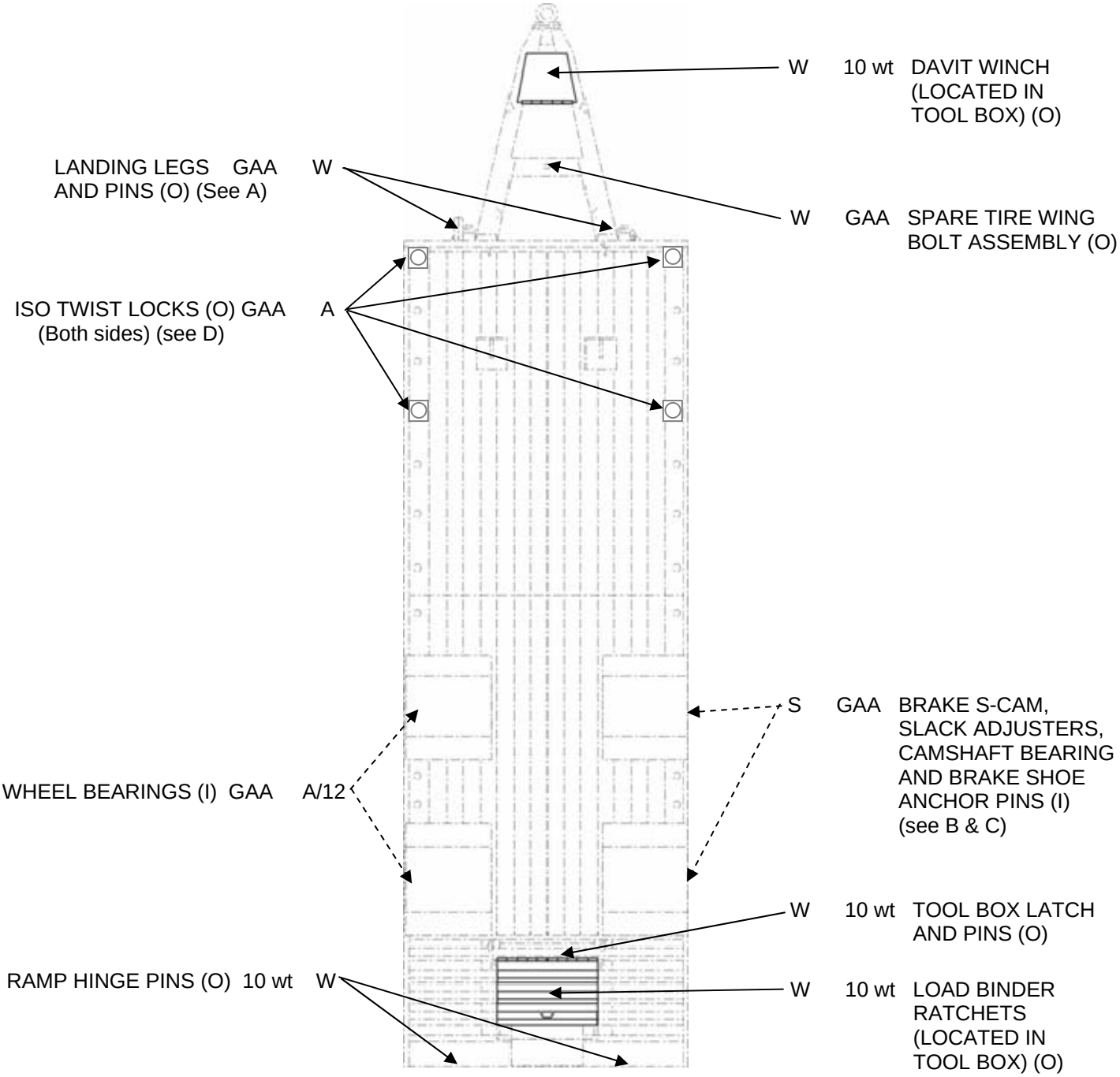
Clean parts with solvent, dry cleaning Type II (SD-2) (P-D-680). Dry before lubricating. Dotted arrow points indicate lubrication on both sides of the equipment if this is not already indicated on the diagram.

The lowest level of maintenance authorized to lubricate a point is indicated by one of the following symbols as appropriate: Organizational (O); Intermediate (I).

ITEM	NOMENCLATURE	INTERVAL	LUBRICANT TYPE	LOM*
1	Landing Legs (5 lube points)	Weekly	GAA	O
2	Ramp Hinge Pins	Weekly	10 WT. Oil	O
3	Landing Leg Pins	Weekly	10 WT. Oil	O
4	Tool Box Hinge Pins	Weekly	10 WT. Oil	O
5	ISO Twist Locks	Weekly	GAA	O
6	Load Tie Down Binder Ratchets	Weekly	10 WT. Oil	O
7	Davit Winch	Weekly	10 WT. Oil	O
8	Spare Tire Wing Bolt Assembly	Weekly	GAA	O
9	Brake S-cam	Monthly	GAA	O
10	Slack Adjusters	Monthly	GAA	O
11	Camshaft Bearing	Monthly	GAA	O
12	Wheel Bearing	Annually	GAA	I
13	Brake Shoe Anchor Pins	Annually	GAA	I

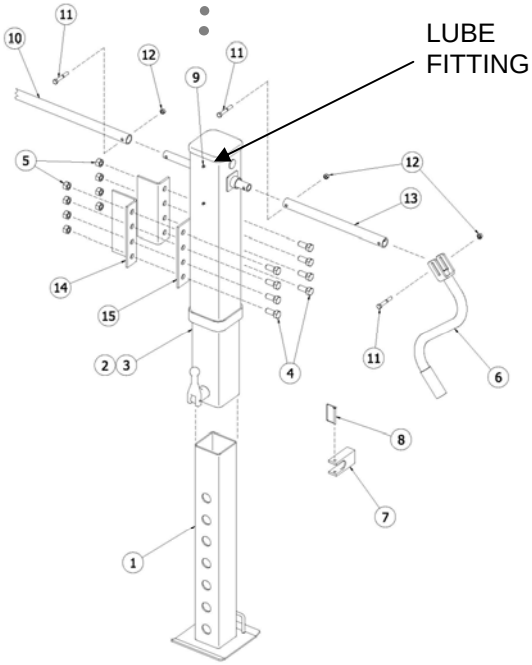
* Level of Maintenance (LOM) O = Organizational, I = Intermediate level

MODEL MTO20A1 ENGINEER EQUIPMENT TRAILER (EET)
LUBRICATION REQUIREMENTS

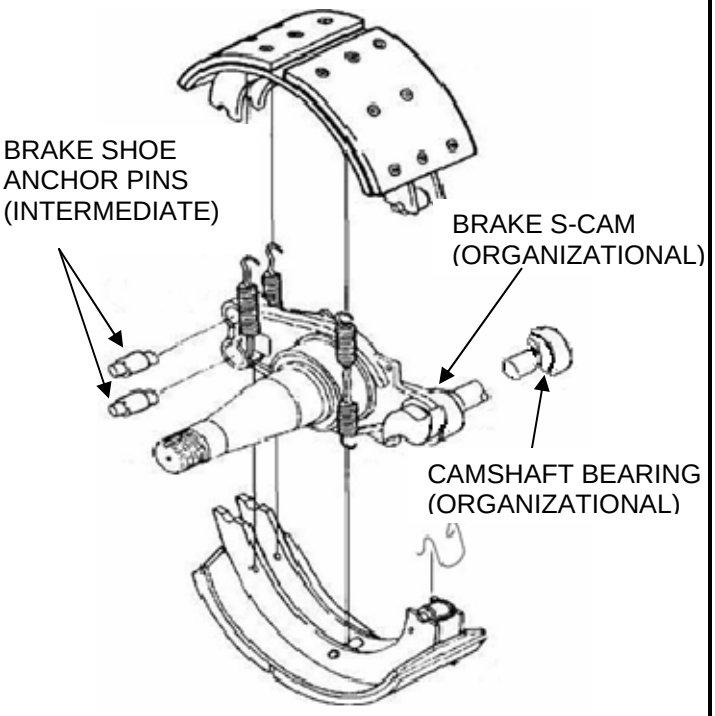


NOTE: Dotted arrow points indicate lubrication on both sides of vehicle.

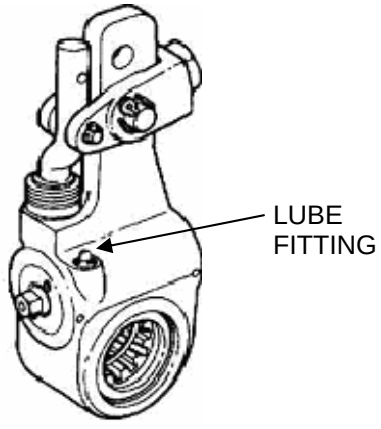
A LANDING LEGS
(Organizational Level)



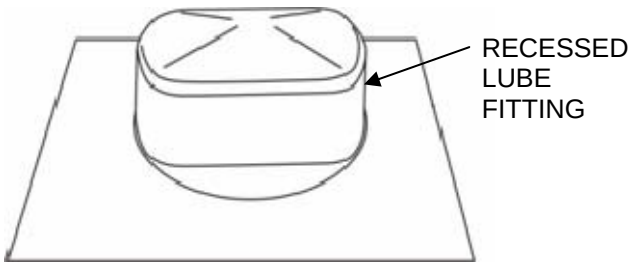
B BRAKES AND HUB
(Intermediate Level)



C SLACK ADJUSTERS
(Organizational Level)



D TWIST LOCKS
(Organizational Level)



NOTES

1. GENERAL

Store all lubricants in closed containers and in clean, dry areas away from heat sources. Keep container covers clean and dry to prevent dust, dirt, moisture, or other foreign material to mix with lubricants. Before lubricating equipment, clean all dirt and grease from surface to be lubricated. Lubricate areas after wash down or fording.

Intervals are based on normal operational tempo. Reduce intervals to compensate for higher than normal operational tempo, severe conditions, or contaminated lubricants. Intervals may be increased during periods of extended inactivity, as long as adequate preservation of equipment is maintained.

Lubrication interval information on the data plates may differ from the information contained in this manual. If this condition occurs the information in the Lubrication Order should be given precedence.

2. INTERVALS

This instruction applies only to vehicles in normal operation. Lubricate more frequently to compensate for abnormal or extreme conditions, such as high or low temperatures, immersion in water or exposure to sand or dust. Lubricants which become contaminated will be changed regardless of scheduled intervals. Intervals for items under warranty will not be changed from those recommended by the manufacturer until after the warranty period has expired. Points requiring lubrication at 12,000 miles on trailers not accumulating that amount in a twelve month period will be lubricated at time of the annual Preventive Maintenance Checks and Service (PMCS).

For this purpose a 10% tolerance (variation) in specified lubrication point mileage is permissible.

3. GREASE POINTS

Pressure gun should be held on fittings until new grease appears. This will assure that all the old contaminated grease has been forced out.

APPENDIX F
TORQUE LIMITS

F-1. TORQUE LIMITS

TORQUE LIMITS

SAE Grade Number	1 or 2	5	6 or 7	8
Quality of Material Capscrew Head Markings	Indeterminate 	Minimum Commercial 	Medium Commercial 	Best Commercial 

NOTE

Head marking may vary with different manufactures.

Capscrew Body Size (Inches) - (Thread)	Torque Ft Lb (N.m)	Torque Ft Lb (N.m)	Torque Ft Lb (N.m)	Torque Ft Lb(N.m)
1/4 20	5 (7)	8 (11)	10 (14)	12 (16)
28	6 (8)	10 (14)		14 (19)
5/16 18	11 (15)	17 (23)	19 (26)	24 (33)
24	13 (18)	19 (26)		27 (37)
3/8 16	18 (24)	31 (42)	34 (46)	44 (60)
24	20 (27)	35 (47)		49 (66)
7/16 14	28 (38)	49 (66)	55 (75)	70 (95)
20	30 (41)	55 (75)		78 (106)
1/2 13	39 (53)	75 (102)	85 (115)	105 (142)
20	41 (56)	85 (115)		120 (163)
9/16 12	51 (69)	110 (149)	120 (163)	155 (210)
18	55 (75)	120 (163)		170 (231)
5/8 11	83 (113)	150 (203)	167 (226)	210 (285)
18	95 (129)	170 (231)		240 (325)
3/4 10	105 (142)	270 (366)	280 (380)	375 (508)
16	115 (156)	295 (400)		420 (569)
7/8 9	160 (217)	395 (536)	440 (597)	605 (820)
14	175 (237)	435 (590)		675 (915)
1 8	235 (319)	590 (800)	660 (895)	910 (1234)
14	250 (339)	660 (895)		990 (1342)

CAUTION

If replacement capscrews are of a higher grade than originally supplied, use torque specifications for that placement. This will prevent equipment damage due to over torquing.

NOTE

Always use the torque values listed above when specific torque values are not available.